birtcher

MANUAL

MODEL 774

Electrosurgery Unit

OPERATING & SERVICE MANUAL

MODEL 774

Electrosurgery Unit

ALWAYS CHECK TO SEE IF THERE IS AN ADDENDUM TO THE CONTENTS OF THIS MANUAL

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4501 North Arden Drive, P.O. Box 4399, El Monte, California, U.S.A. 91734-2399
(818) 575-8144, TLX 4720899 Birtcher Elm

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INTRODUCTION

Congratualtions on the purchase of your new Birtcher Model 774 Electrosurgery Unit. The 774 is a versatile, solid state electrosurgery unit. The 774 features isolated output of both the high power (major surgery output) and the independent Bipolar output.

For the operator, the dials on the front panel are color coded for mode selection and level setting. The output activation may be by hand switch or footswitch. Only one output will be active at a time. The patient plate has an alarm for faulty cable indication.

Output characteristics in Cut and Coag are tailored for good surgical results. Coag is a classical damped sine wave. The controlled continuous radio frequency (RF) output gives excellent cutting results in surgical irrigating liquids for the T.U.R. procedure. The Coagulation output achieves pinpoint coagulation.

The Birtcher Model 774 has an independent Bipolar output. This output (22 watts) has a separate dial for setting power output level which is independent from any panel control in the major surgery unit. The Bipolar output may be activated by an independent footswitch operation or special switching forceps.

A certain amount of specific understanding is required for the intended use of electrosurgery. The operation, limitations and precautions for use are discussed in the Operating Section 2. Section 3 gives general principles and some specific uses and precautions needed for safe, effective use of the electrosurgery unit. Detailed technical information, troubleshooting, maintenance, calibration and repair of this unit are in the last five sections of this manual.

July 1, 1987

BIRTCHER CORPORATION WARRANTY

Birtcher Corporation (Manufacturer) warrants all products to be free from defects in material and workmanship under normal operation and use. The warranty period for major equipment is twelve (12) months to the dealer's original customer. All accessories are warranted for ninety (90) days. There is no warranty on expendable, single-use items.

Manufacturer does not warrant any product which has been damaged as the result of accident, abuse, misuse or negligence.

This warranty is limited to the repair or replacement, at the Manufacturer's option, of any product, or part thereof, which has been returned to the Manufacturer within the specified warranty period, and which after examination shall disclose to Manufacturer's satisfaction that the product is defective. Transportation of the product to the Factory must be prepaid; the product, after repair or replacement, will be returned at the expense of the dealer or end-user.

The warranty does not apply to any product, or integral part thereof, which has been altered or serviced by other than the Manufacturer.

RETURN GOODS POLICY

No equipment, supplies or material may be returned to our Factory for reason of warranty repair, non-warranty repair, etc, **without prior authorization.** A Return Goods Authorization (RGA) number and label will be issued by our Customer Service Department. This label **must be affixed externally to the carton(s)** being returned.

Please call Birtcher's Customer Service Department for a Return Goods Authorization number and label for each transaction. (800)423-4889 - In California (818)575-8144

Special Notice....Any merchandise returned to Birtcher Corporation **without a Return Goods Authorization label affixed externally** to the shipping carton **will not be accepted** by our Receiving Department....**The merchandise will be returned to the sender.**

The Warranty and Return Goods Policy stated herein supersede all others either expressed or implied and shall be governed and executed under the laws of California, U.S.A.

TABLE OF CONTENTS

SECTION 1 GENERAL INFORMATION

1.1 Description 1-1

1.2 Equipment Limitations and Precautions 1-1

SECTION 2 OPERATING INSTRUCTIONS

2.1 Operating Controls and Indicators 2-1

2.2 Electrosurgery Accessories 2-3

2.3 Initial Check Out 2-8

2.4 Initial Operation 2-8

2.5 General Care Of Accessories And Unit 2-9

2.6 Sterilization 2-9

2.7 Recommended Practices - Patient Plate 2-9

SECTION 3 GENERAL PRINCIPLES OF ELECTROSURGERY

3.1 Electrosurgery Cutting 3-1

3.2 Electrosurgery Coagulation - Desiccation 3-2

3.3 Coagulation Around Ball Point 3-2

3.4 Electrosurgery Coagulation - Fulguration 3-3

3.5 Coagulation Using Hemostat 3-3

3.6 Cutting With Blended Coagulation 3-4

3.7 Bipolar Coagulation 3-4

SECTION 4 EQUIPMENT FUNCTIONAL DESCRIPTION

4.1 Block Diagram 4-1

4.2 Mode - Output Waveshapes 4-3

SECTION 5 SCHEMATIC DESCRIPTION AND SPECIFICATIONS

5.1 Schematic Description 5-1

5.2 Specifications 5-6

TABLE OF CONTENTS (CONTINUED)

SECTION 6 TROUBLESHOOTING FOR REPAIR

6.1 General Information 6-1

6.2 Problem Area Circuit Isolation 6-1

SECTION 7 MAINTENANCE AND CALIBRATION

7.1 General Information 7-1

7.2 Equipment Required 7-1

7.3 Calibration 7-2

7.4 Calibration L.E.D. Display 7-3

SECTION 8 DRAWINGS, PARTS LIST 8-1

ALWAYS CHECK TO SEE IF THERE IS AN ADDENDUM TO THE CONTENTS OF THIS MANUAL

SECTION 1

GENERAL INFORMATION

1.1 DESCRIPTION

The Birtcher Model 774 electrosurgery instrument is a radio frequency (RF) generator at .5 megacycles.

The three (3) output power levels in watts are displayed digitally. Controls for setting output modes and selecting type of output and power levels are available to the operator on the front panel of the unit.

The Coagulation output is a classical damped RF output which is accompanied by an audio tone and color coded panel light (blue).

The Cut output is a continuous RF output accompanied by an audio tone that is lower in pitch than the Coag tone. The cut output has a color coded panel light (yellow).

Three (3) additional Cut modes have the damped Coag output blending successively into the cut signal for cutting with additional hemostasis. Blend modes are designated low, medium, and high.

The output is isolated and has a patient plate cable fault indication system accompanied by an audio tone which logically disables the instrument in case of a cable disconnection.

Output of the Model 774 may be activated by a footswitch or hand activated by an electrosurgical pencil or forceps.

The Bipolar is an independent, low power (22 watts) electrosurgery unit. The output is a damped RF signal. The Bipolar output may be activated by a footswitch or by special hand switching forceps. The activation is accompanied by an audio tone which is higher in pitch than the Cut or Coag tones.

1.2 EQUIPMENT LIMITATIONS AND PRECAUTIONS

Operator Precaution

The safe and effective use of electrosurgery is dependent, to a large part, upon factors which are under the control of the operator and not entirely controllable by the design of the unit. Instructions should be understood and personally experienced before procedureal use in order to enhance safety and effectiveness.

Duty Cycle

The normal operation and full power duty cycle is 50% (10 seconds ON; 10 seconds OFF). The abnormal operation of no load and full power is 17% (10 seconds ON; 50 seconds OFF).

Patient Plate

The use, preparation and proper placement of the patient plate is a key element in the safe and effective use of electrosurgery, particularly in the prevention of burns.

Apparent low power output or failure of the electrosurgical equipment to function correctly at otherwise normal settings may indicate faulty application of the patient plate or failure of an electrical lead. Do not increase power output before checking for obvious defects or misapplication.

Stray Electrical Current

The Model 774's active output current is not ground seeking. However, accidentally keying the unit ON without proper placement of the active electrode may cause the current to seek a return through the nearest (indirect) path back to the patient plate. Therefore, accidental burns to the operator are possible from the active electrode if it is carelessly handled by personnel or if placed on the patient when not in use.

Monitoring Electrodes

The risk of burns at the site of monitoring electrodes on a patient undergoing electrosurgery are reduced when the monitoring electrodes are placed as far as possible from the electrosurgical site and the patient plate. Protective impendances incorporated into the monitoring leads may further reduce the risks of such burns. Needles should not be used during such procedures.

Interference With Other Devices

Use of electrosurgery can result in the possibility of interference with other devices, particularly **cardiac pacemakers.** Precautions should be taken to assure that the patient's well being is maintained in the event of such interference.

Restriction Of Flammable Materials In Surgical Site

The risk of ignition of flammable materials, gases or liquids is an inherent hazard in the use of electrosurgery which cannot be entirely eliminated by device design. Careful attention must be given to controlling the flammable gases and liquids produced within the body cavity by natural processes, and to restricting other materials, including surgical drapes, from entering the electrosurgery site.

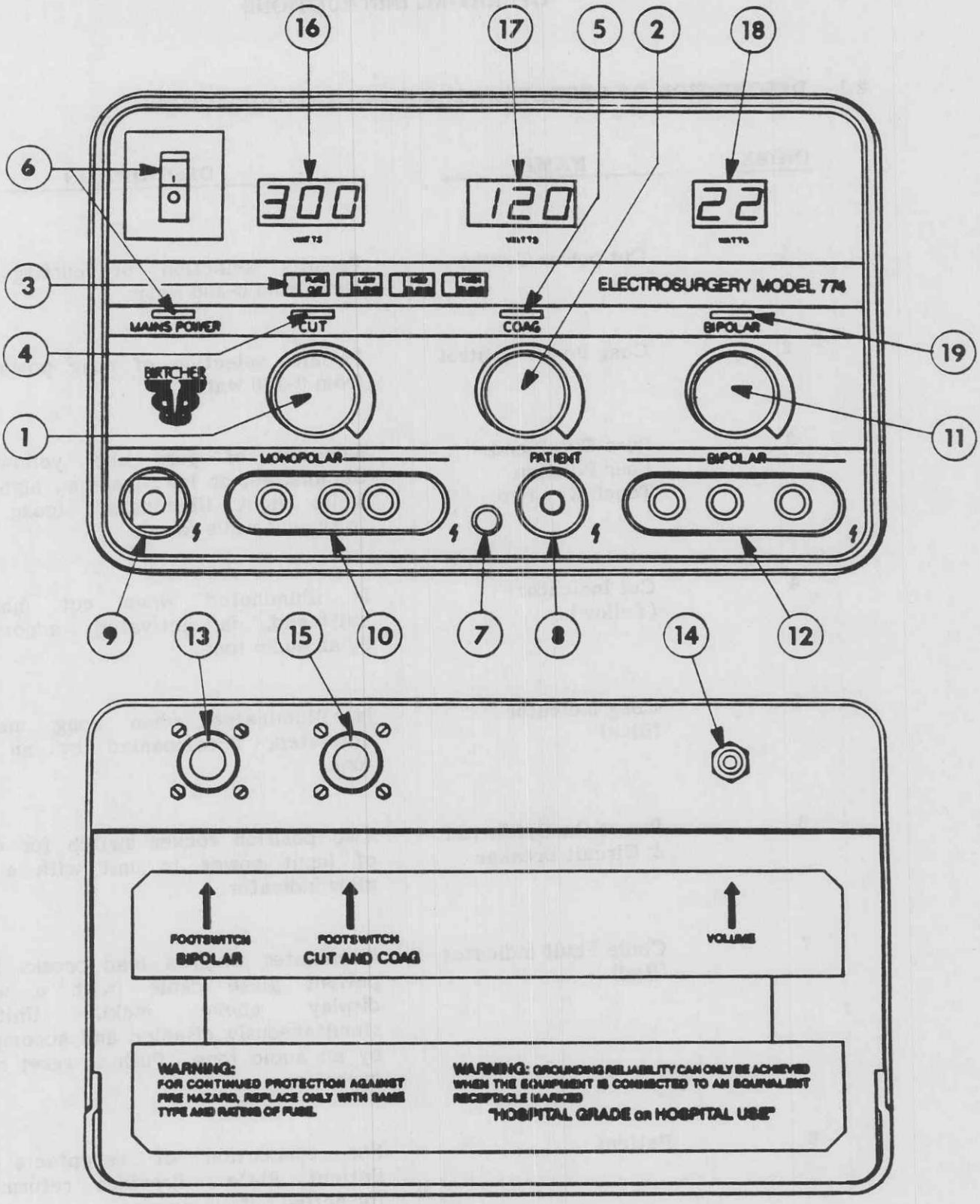
WARNING

Electrosurgery is not an recommended modality for circumcision procedures.

Active Output - Resectoscopes, Endoscopes, Etc.

A fault, causing the active output to short to the case or the capacitive coupling, puts the scope and other instruments in the category explained under Stray Electrical Current. Therefore, the Resectoscope insulating eye piece and similar instrument-supplied safety devices should always be used for purposes of protection.

OPERATING INSTRUCTIONS



OPERATING CONTROLS AND INDICATORS

FIGURE 1

SECTION 2

OPERATING INSTRUCTIONS

2.1 DESCRIPTION OF OPERATING CONTROLS AND INDICATORS

INDEX	NAME	DESCRIPTION
1	Cut power Control	Permits selection of cutting power level from 0-300 watts.
2	Coag Power Control	Permits selection of coag power level from 0-120 watts.
3	Pure Cut-Blend Four Position Touch Key Pad	Selection of pure cut, yellow light illuminated; or low, medium, high blend, white light illuminated; (coag added to the cut wave form).
4	Cut Indicator (Yellow)	Is illuminated when cut mode or cut-blend, is activated, accompanied by an audio tone.
5	Coag Indicator (Blue)	Is illuminated when coag mode is activated, accompanied by an audio tone.
6	Power On/Off Switch & Circuit Breaker	Two position rocker switch for control of input power to unit with a green glow indicator.
7	Cable Fault Indicator (Red)	Illuminates when a lead breaks in the patient plate cable (with a written display above jack). Unit is simultaneously disabled and accompanied by an audio tone. Push to reset normal operation.
8	Patient	For connection of receptacle from Patient Plate. Provides return path for active output current.
9	Active Accessories	One active receptacle to accept #12 tip.

INDEX	NAME	DESCRIPTION
10	Active Switching	Three recessed banana pin connectors for use with disposable or permanent hand control.
11	Bipolar	Permits selection of coag power level from 0-22 watts.
12	Bipolar Connector	Three recessed banana pin receptacles for use with switching accessories, bipolar or monopolar electrodes.
13	Footswitch (Bipolar Module)	Four pin receptacle for connection of the bipolar footswitch.
14	Audio Volume	Controls the audio levels for the cut, coag, cut-blend, and bipolar coagulation modes and for the cable fault.
15	Footswitch	Four pin receptacle for connection of the major surgery footswitch.
16	L.E.D. Display	Display of cut power 0-300 watts.
17	L.E.D. Display	Display of coag power 0-120 watts.
18	L.E.D. Display	Display of bipolar power 0-22 watts.
19	Bipolar Indicator (White)	Is illuminated when bipolar mode is activated, accompanied by an audio tone.

ACCESSORIES

Accessories included with the Model 774 electrosurgery unit are as follows:

Qty.	Part Number	Description
6	730	Disposable Dispersive Pads
1	674-40	Adapter
6	718 VDS	Hand Switching E/S Pencils
1	774-M	Operating & Service Manual

Model 3282 Accessory Kit Includes:

Qty.	Part Number	Description
1	795-12	Handle and Cord
1	747	Patient Plate
1	748	Gel
1	774-19	Footswitch - Two Pedals

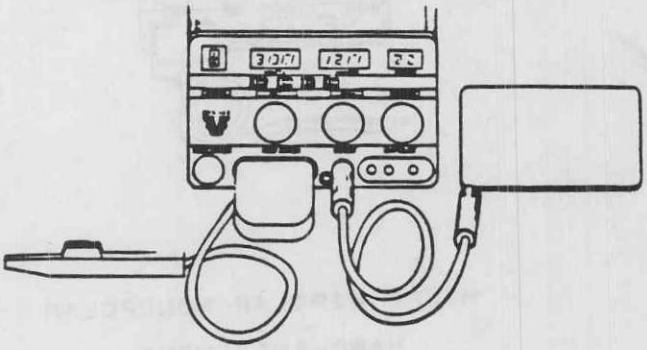
For additional accessories, see Section 2.2.

GENERAL ELECTROSURGERY GENERATOR OUTPUT CONNECTIONS

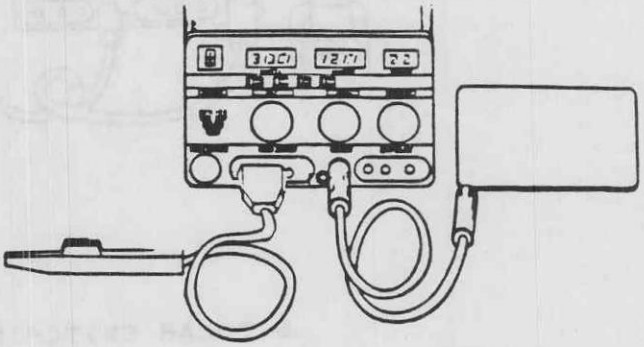
Refer to Section 2.4

The following diagrams are meant to give a general connection layout for various types of electrosurgery accessories. Complete details regarding electrosurgery accessories can be obtained from the Distributor or from the Manufacturer.

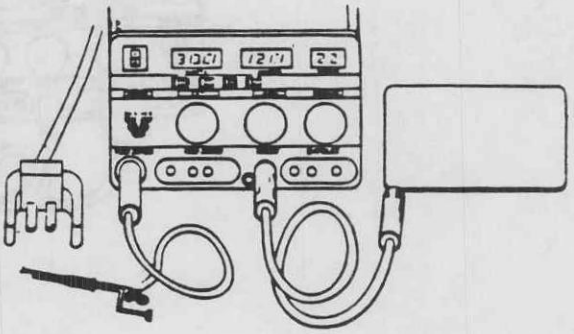
MONOPOLAR HAND-SWITCHING



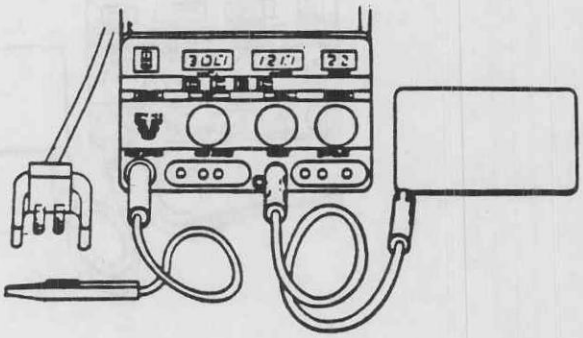
MONOPOLAR FORCEPS SWITCHING



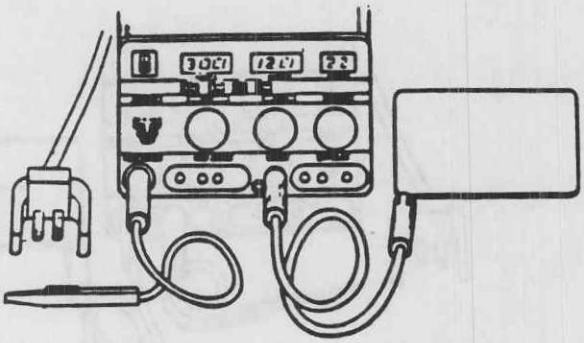
MONOPOLAR LAPAROSCOPE FOOT-SWITCHING



MONOPOLAR FOOT-SWITCHING



MONOPOLAR FORCEPS FOOT-SWITCHING



MONOPOLAR RESECTOSCOPE FOOT-SWITCHING

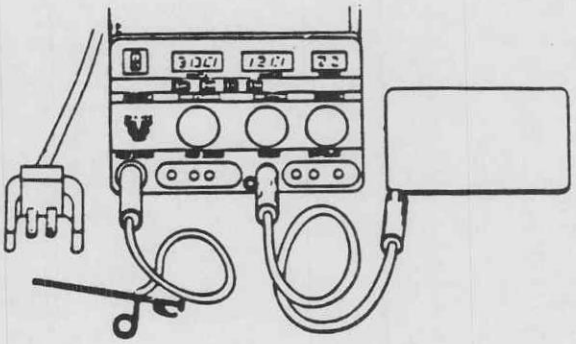
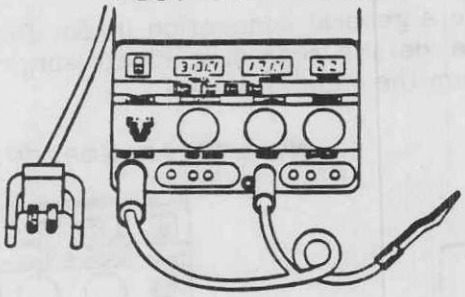
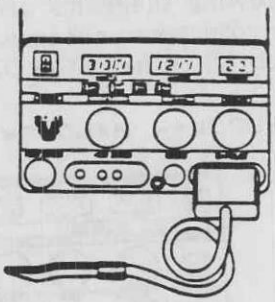


FIGURE 4

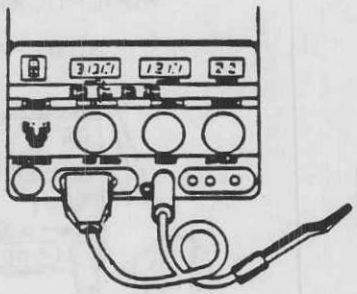
BIPOLAR FORCEPS
FOOT-SWITCHING



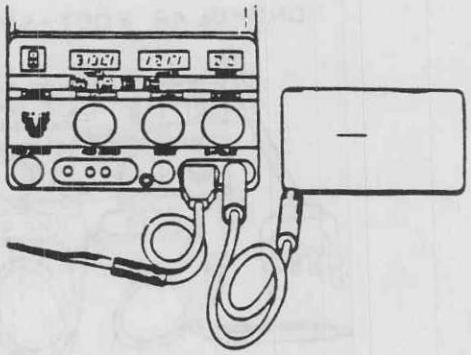
MICRO BIPOLAR SWITCHING



BIPOLAR SWITCHING



MICRO BIPOLAR MONOPOLAR
HAND-SWITCHING



MICRO BIPOLAR MONOPOLAR
FOOT-SWITCHING

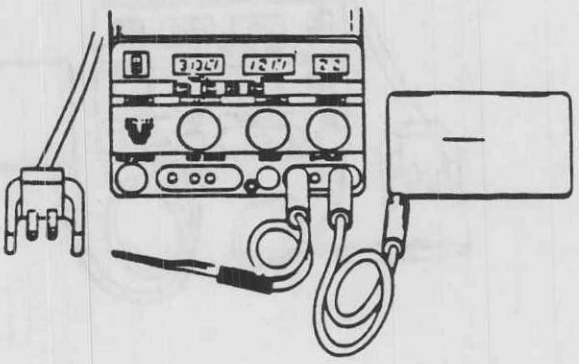


FIGURE 4

2.3 INITIAL CHECK OUT

After unpacking, check the shipment for completeness of accessories. Then verify, by inspection, that no physical damage has occurred during shipment. Carefully inspect all accessories, cords, instrument case and panels. For complete technical tests refer to Section 7. This section gives the Bio-Medical Engineer complete performance test information. See Duty Cycle limitation in Section 1, page 1-2.

2.4 INITIAL OPERATION

The top cover of the Birtcher Model 774 describes the basic operation and cautions.

1. Turn on power.
2. Select Cut mode and set Cut level.
3. Set Coag level.

Detailed information for accessory connections is shown in Figure 4, pages 17-19. Accessories available for use with Model 774 are shown on pages 11-16.

Output Settings

If exact settings are not known, a good philosophy is to start low and increase the output until the desired electrosurgery effect is achieved.

Power Turn On

Power indicator lamp glows green when power switch is turned ON. Pull out patient plate cable to check for proper operation of the cable fault light and audio tone. Reinsert patient plate cable and press cable fault switch to reset fault light, output display, and enable unit operation.

Select Cut Mode

Cut mode is comprised of Pure Cut, Low Blend, Medium Blend, and High Blend. The Cut mode is always a selected mode when power is applied and light indicator is ON.

Set Cut Level

Set Cut level dial to minimum for initial test.

Set Coag Level

Set Coag level dial to minimum for initial test.

Footswitch Or Hand Switch Activation

With either the footswitch or the Birt-A-Switch plugged into the unit, check for audio and light indication of Cut and Coag.

2.5 GENERAL CARE OF ACCESSORIES AND ELECTROSURGERY UNIT

A careful inspection of cords, handles and cord connections at regular intervals will insure best performance of your Birtcher Solid State Electrosurgery unit. Replace all worn cords. Have a Bio-Medical Engineer check snug fit of all cord connectors.

The cabinet finish on this unit is baked enamel. Blood, chemicals or other soil can and should be promptly removed with soap and water. Clean the front panel overlay with soapy water or isopropyl alcohol only.

Maintenance should be performed at six month intervals in order to insure peak operating performance of your new Model 774 electrosurgery unit. Power output and leakage tests should be checked at three month intervals in order to maintain a history of electronic output characteristics by which the unit can be measured.

If power output levels change, beyond specification, between successive intervals, adjustments should be made. Necessary adjustments are described in Section 7, Maintenance and Calibration, of this manual.

2.6 STERILIZATION

Many of the optional reusable accessories that may be used with the Model 774 may be steam sterilized or ETO gas sterilized depending on the product. Disposable accessories cannot be re-sterilized. Please consult the factory for recommended sterilization cycles for reusable accessories.

2.7. RECOMMENDED PRACTICES FOR USE OF A PATIENT PLATE

The following are recommended practices for the proper placement, use and surveillance of the patient plate:

1. The patient plate must be kept clean and smooth and should always be applied with a generous application of **Birtcher #394 Kontax-S Gel Conductor.**

2. Wet towels or soap lather should not be used as conductive agents because they may dry out, resulting in high frequency skin burns to the patient.

3. Never apply patient plate over heavily matted hair or over scar tissue.

4. Needles should not be used as dispersive electrodes when using electrosurgery.

SECTION 3

GENERAL PRINCIPLES OF ELECTROSURGERY

Electrosurgery is the use of radio frequency (Rf) energy to accomplish various surgery effects. The type of energy, (continuous RF, intermittent damped wave RF, or a combination of the two), accomplishes different results. Control and technique are also important.

Two (2) output controls are incorporated into the Model 774 (major surgery unit): Cut and Coag. Three (3) electrosurgery effects are controlled from the application of these two RF power outputs.

1. Electrosurgical Cutting
2. Electrosurgical Coagulation - Desiccation Type (drying and sealing)
3. Electrosurgical Coagulation - Fulguration Type (burning, charring of tissue)

3.1 ELECTROSURGERY CUTTING

For electrosurgery cutting, the continuous RF power waveform heats and explodes the tissue cells immediately in front of the guiding blade or loop. The heat results from the current through the tissue and the spark itself which may contribute the major part of the total heat. Therefore, cutting is actually achieved with the electrical current and is merely guided with a dull blade or wire loop.

CORRECT APPROACH FOR USING ELECTROSURGERY BLADE AND LOOP

The operator may experiment in cutting fat and other types of tissue, using somewhat more power for fat. Fat is the most difficult tissue to cut due to the fact that it does not carry the electrical current readily. However, fat cuts more readily in live tissue than in dead tissue.

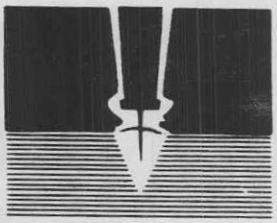
The operator should then experiment with the other shaped blades, needle points and loops. While loops of various shapes will be found particularly desirable for scalloping out pieces of tissue of various sizes and shapes, here too the operator should experiment using only a portion of the loop at first, then gradually learning to bury most of it into the tissue. Likewise, the vertical stroke should be first employed. A fair amount of power is required in cutting with the loop inasmuch as the circumference of a loop presents a considerable cutting length.

Cutting in a wet field requires more power than a dry field. When a loop is used under surgical irrigating fluids as in a T.U.R. procedure, high power is required (over 150 watts) since much of the energy is conducted away through the liquid.

3.2 ELECTROSURGERY COAGULATION - DESICCATION

The definition of desiccation comes from the Latin root, desiccare, which means to dry. For Coagulation the Model 774's electrosurgery output is a damped RF power at a low frequency repetition rate (30 KHz). Its high voltage damped output produces Coag power into various load conditions. That is, the high electrical resistance of dried tissue or low resistance of a wet field will receive a reasonable constant power as set on the coag dial. The high, but intermittent, RF power causes dehydration but does not create temperature that is high enough to produce tissue cell explosion (cutting).

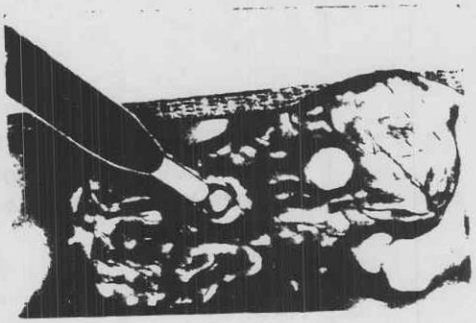
The desiccation process is caused by the heat rise of tissue at the surface contact of the active electrode due to RF current concentration and flow through tissue resistance at this point. Continual desiccation at increased intensity will result in tissue destruction and charring.



In surgery the active electrode or small needle point may actually be inserted into the tissue.

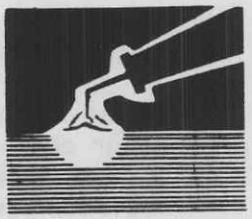
3.3 COAGULATION AROUND BALL POINT

When an electric current flows through any substance which offers resistance to its passage, heat is generated. In electro coagulation the current flows between the active electrode and the patient plate. No heat is generated at the patient plate because of the large area of its surface. Since the same volume of current concentrates around the very small surface area of the active needle or ball point, the resistance of the immediately adjacent tissue is sufficient to create adequate heat to cook the tissue.



Experience alone must be the guiding factor as to the depth of coagulation. But it must be kept in mind that a longer time factor will bring about greater and deeper coagulation than a greater amount of power for a very short period. The same experiment as referred to in the Electrosurgery Cutting Section, 3.1, may be used to test the effects of electro coagulation.

3.4 ELECTROSURGERY COAGULATION - FULGURATION



The definition of fulguration comes from the Latin root fulgor which means lightning. The active electrode is held slightly out of contact (1mm to 3mm) with the surface being treated. The resulting arching to the surface is useful coagulation for large bleeders and tissue char.

3.5 COAGULATION USING HEMOSTAT

Electro coagulation in major surgery is very useful as a means of procuring hemostasis. Operations in which small and fair sized bleeders are encountered and in which orinarily many hemostats or ligatures are required may be handled using the coagulation current in many cases. These small bleeders may be seized in the usual manner with the hemostat. The operator or assistant may then hold the hemostat up in such a manner that no portion of it contacts any tissue except for the actual point which is clamped to the bleeder. Then the active blade may be brought in contact with the hemostat, an inch or two above the point and the current turned on.

The current will flow down the hemostat to its point and gently coagulate the walls of the bleeder together. Surgeons have reported complete thyroidectomies, hysterectomies, mastectomies, nephrectomies, etc. without the use of ligatures.

Very small vessels which usually do not bleed after the clamp is removed can be definitely sealed with a mild current. Moderate sized vessels which ordinarily bleed after removing the clamp may be controlled by coagulation through the hemostat by using just enough current and time to slightly blanch the tissue of the vessel. Some surgeons have reported success in coagulating larger vessels but, as a general rule, it is recommended that only vessels up to 1/16 inch in diameter be controlled by this method. Conventional ligation should be used on larger vessels.

In employing this method, be sure that the operating field is sponged free of excessive fluids around the point of the hemostat, otherwise current will be dissipated through the fluids.

3.6 CUTTING WITH BLENDED COAGULATION

The Cut function includes four (4) modes: Pure Cut, low, medium, and high Blend. The Blend modes are continuous RF Cut power with the damped Coag signal blended in at a repetitive rate. The Coag signal repetitive rate varies with the mode selected and at high Blend, the signal looks similar to a standard Coag damped signal with a continuous RF Cut signal between each damped Coag energy burst. See illustrations, Section 4, paragraph 4.2. The heavier blend of Coag produces increased hemostasis during Cut.

3.7 MICRO BIPOLAR COAGULATION

The Model 774's Micro Bipolar option is an independent, low power, isolated output for electrosurgery. Its output power signal is a damped wave shape and its dial setting and output are independent of the major surgery unit. Footswitch and forcep power activation is available.

Bipolar technique is where two electrodes are employed with the current flowing between them. The two electrodes are usually in close proximity to each other, such as forceps. (See Figure #6. The forceps are inactive when the tips are open and are active when the tips are closed.) Bipolar technique does not allow Coagulation current to flow through surrounding organs or tissues.

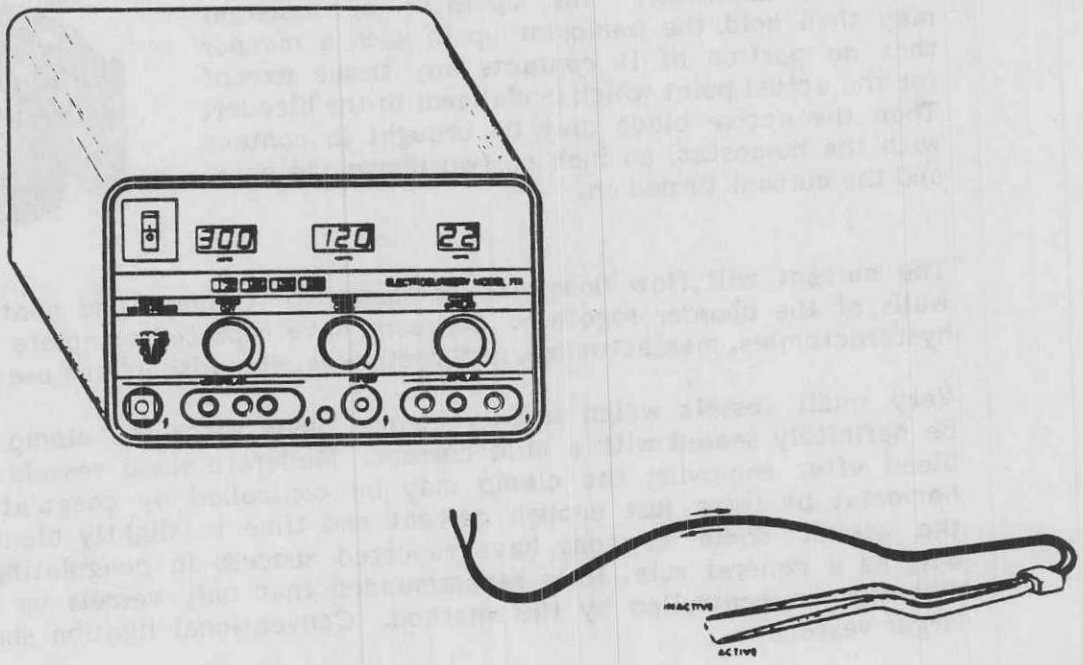


FIGURE 6

SECTION 4

EQUIPMENT FUNCTIONAL DESCRIPTION

4.1 BLOCK DIAGRAM DESCRIPTION

The block diagram (Figure 7) is drawn to correspond to the same layout as the schematic diagram. Arrows on signal lines show general signal control flow.

Logic Control

The logic control receives a "Turn On" signal from the footswitch or the Birt-A-Switch (switch isolator circuit) which then activates either Cut or Coag depending upon which one the operator has switched. The logic supplies proper repitition rates and turns on timing and blend mixing. The dispersive (patient plate) alarm defeats all logic when the patient plate dispersive circuit is not complete.

Cut Control

The Cut control is composed of two major circuits: The Cut amplitude control and the zero angle control which controls the driver.

The Cut amplitude, which is set by the operator and the output RF feedback to the circuit, is part of the Cut amplitude control. It works in conjunction with the zero angle control circuitry for Class C type output drive.

Driver

Both Cut and Coag signals are sent to the same driver. The driver then drives the output stage to a continuous RF power output for either Cut or Coagulation damped RF power energy bursts. In the Blend mode, the signals are successively mixed. The cut output is accompanied by an audio tone and a yellow light indicator. The Coag output is accompanied by an audio tone and a blue light indicator.

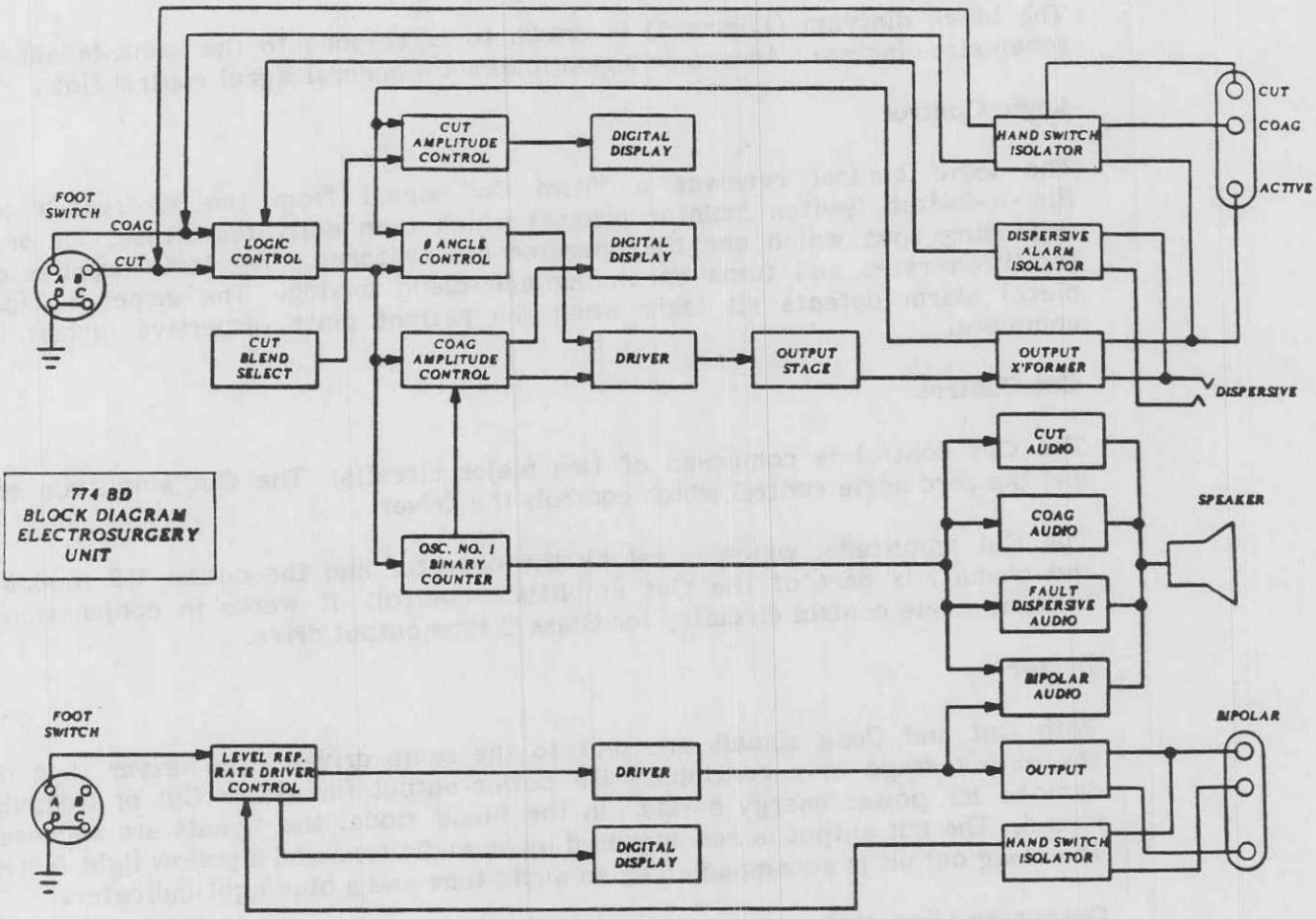
Output And Isolation

The output transistors drive an RF tuned output isolation transformer. Both hand switch contacts and the dispersive patient plate are connected to this isolated output. These isolation circuits enable the electrical operation to be referenced back to ground without defeating the output isolation.

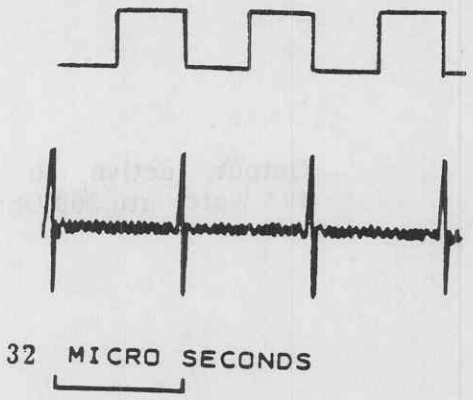
Bipolar

In the Bipolar circuit, an I.C. comparator amplifier doubles as the repetition rate generator and level control. This generator drives a drive transistor which, in turn, drives the output transistor. The isolated output has a switch isolator for forcep power output activation switching. Audio tone and a blue light accompany power output activation. Footswitch activation is also available.

FIGURE # 7


FOOT SWITCH
COAG
CUT
A B C D
LOGIC CONTROL
CUT BLEND SELECT
CUT AMPLITUDE CONTROL
DIGITAL DISPLAY
% ANGLE CONTROL
DIGITAL DISPLAY
COAG AMPLITUDE CONTROL
DRIVER
OUTPUT STAGE
OSC. NO. 1 BINARY COUNTER
HAND SWITCH ISOLATOR
CUT
COAG
ACTIVE
DISPERSIVE ALARM ISOLATOR
OUTPUT X'FORMER
DISPERSIVE
CUT AUDIO
COAG AUDIO
FAULT DISPERSIVE AUDIO
BIPOLAR AUDIO
SPEAKER
774 BD
BLOCK DIAGRAM
ELECTROSURGERY
UNIT
FOOT SWITCH
A B C D
LEVEL REP. RATE DRIVER CONTROL
DRIVER
DIGITAL DISPLAY
OUTPUT
HAND SWITCH ISOLATOR
BIPOLAR

1



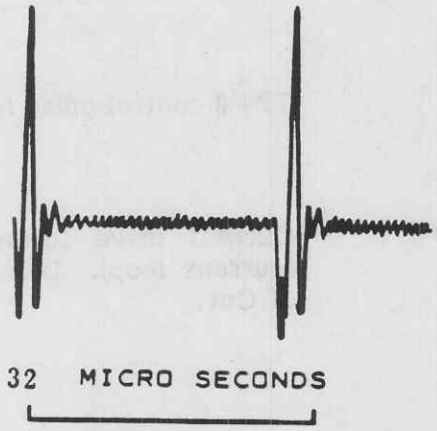
15V

TP2 Coag repitition rate logic drive to Coag amplitude control amplifier A4.

7 Amps PP

Coag drive to output transistor at current test loop.

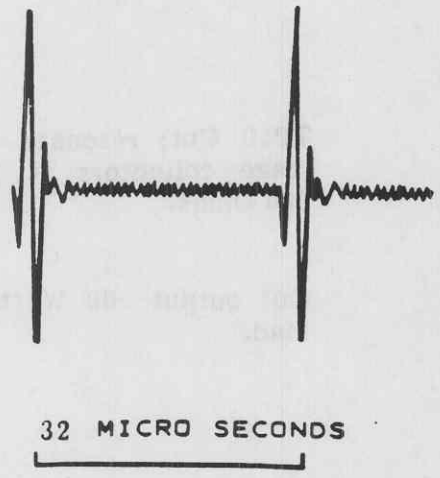
2



375 VPP

TP10 Coag, resonate tank voltage at the collector of the output stage 75 watts into 300 Ohms load.

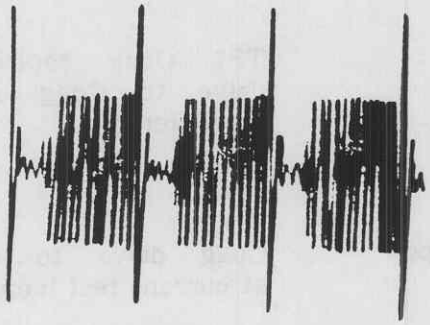
3



1600 VPP

Output, active to patient plate. 75 Watts into 300 Ohms load; loaded 1600 VPP; unloaded 3000 VPP; Coag.

4

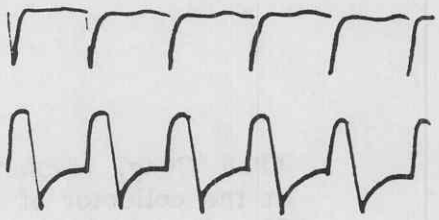


800 VPP

Output, active to patient plate 175 Watts into 300 Ohms; Blend.

32 MICRO SECONDS

5



15 V

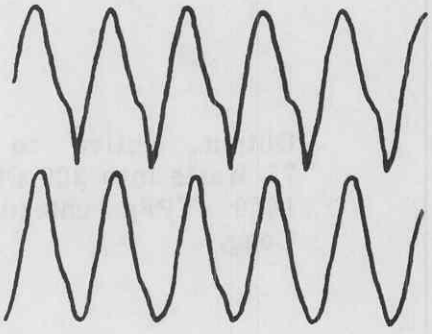
TP4 Ø control pulse for Cut.

5 Amps PP

Current drive to output transistor, (current loop). Drive for 200 Watts of Cut.

32 MICRO SECONDS

6



200 VPP

TP10 Cut; resonate tank at output stage collectors at 200 Watts into 300 Ohms.

700 VPP

Cut output 200 Watts at 300 Ohms load.

2 MICRO SECONDS

SECTION 5

SCHEMATIC DESCRIPTION AND SPECIFICATIONS

5.1 SCHEMATIC DESCRIPTION

Circuit Description - Reference 774 Schematic

The 774 electrosurgery unit is composed of the following major circuit sections. Each is explained in circuit detail operations.

1. Coag power generation
2. Cut power generation
3. Control logic Cut, Coag, and Blend
4. Hand chuck isolation switch
5. Dispersive alarm isolator
6. Audio tones
7. Power supply
8. Micro Bipolar

Sound Signals

Pulses from U3 binary counter gate U7 or U8 when U1, Pin 10 or Pin 11 are gated driving SPK R1 and DS302 or DS306 for Cut, Blend and Coag.

Coagulation Power Generation

Coag power is generated by the operation of four basic circuit sections.

1. A4 control comparator amplifier
2. Z302 - Z303, DP303 - DP305 digital display
3. Q4 thru Q11 power output driver
4. Power output transistors Q12 thru Q16

A4 is triggered on at the Coag repetition rate. This is by logic control from TP2, via clock pulses from Z3. The output of A4 switches to ground, Q4 is turned OFF and Q11 turns ON driving the output transistors Q12 thru Q16 ON. Current increases in the output transformer inductance T3. At the same time Q1 turns OFF charging C18 thru R76. This voltage is fed back to Pin 2 on A4 comparator.

When this voltage is equal to the voltage at input Pin 3 of A4, set by the Coag power control knob R62, A4 resets. The output of A4 goes positive. Q4 tru Q10 turns ON back biasing the output transistors to about -7 volts. The output transistors turn OFF. The output transformer now has a damped wave shape output because of its self-inductance of the transformer and the capacitor C40, causing a series resonant circuit. This energy oscillates and is a damped wave output into the output load. Different power levels are accomplished by the voltage setting of the Coag power control knob. Different levels of stored energy accomplishes output power control.

Cut Power Generation

Cut power is a continuous wave radio frequency (RF) output. The output power generator may generally be described as a Class C, RF power generator. However, this is not completely descriptive. Aspects of Class D and Class E amplification are present in a configuration that can tolerate open and short circuits and operate at high loaded efficiencies. During part of the cycle, the output transistors conduct. The rest of the cycle is self-resonant at the natural frequency of the output transformer and its capacitors. When Cut circuitry is enabled TP3 is high. The Cut output will function as follow:

1. A2 output goes negative and positive because A2 changes state by itself for this first cycle (as a self oscillator). CR31, R52, and C11 are the components controlling this multivibrator action.

2. The negative swing of A2 couples thru CR34, C12, CR36 to A3, Pin 2 causing A3 comparator amplifier output to switch to ground.

3. Q4 thru Q10 is turned OFF and Q11 is turned ON driving the output transistor ON by the current thru R151 until the output of A3 returns to a high state. This time (phase angle 0 output conduction time) is controlled by the output voltage of A1. This voltage sets and clamps a voltage on C13 in the A3 feedback CR38, R58 and C13 to the inverting input of A3, Pin 3. This voltage level regulates 0, the output-turn-on conduction time.

   The output of A1 is the control signal to regulate the Cut amplitude level. It is set by the Cut amplitude control and is the Cut amplitude feedback regulator. The output feedback to A1 is from T3 the output transformer thru C7, R35, CR26 to Pin 2, A1. The non-inverting input from the Cut level control knob and the amplifier senses the RF output amplitude which feeds back to the inverting differential input which makes a differential measurement of the two and adjusts A1 output to control the RF output amplitude.

4. A3 returns to the high state by its own feedback, R58 discharging C13. (This on-to-off time is the phase anlge 0 output conduction time.)

5. A3, returning to the high state, turns OFF the drivers and output transistors. The output tank T3, C40 oscillates positive and back negative (the first cycle of the RF continuous wave).

6. This output wave shape from the T3, C40 RF output tank is fed back to the control circuitry at two points: The conduction (0) angle control comparator A2 and the Cut amplitude control differential amplifier A1.

7. The positive-going RF signal thru C59, R43, R44, and CR30 charges C11 positive. When the output signal oscillates negative, Pin 2 of A2 switches the output negative and A3 is pulsed negative continuing the RF CW cycle as explained from Step 2.

8. A1 amplifier measures the difference between the Cut amplitude set level and the actual RF peak to peak output. The set level is at Pin 3, and the measured RF level is to Pin 2. Peak to peak thru CR26 is stored at C8. Low voltage here in respect to Pin 3 level set voltage, causes the output of A1 to go high with an increase voltage storage on C13. This increases the phase angle on time of A3 and the conductions time of the output stage. The result is a higher output RF peak voltage. If the RF output is unloaded and becomes higher, the reverse occurs. Output tank regulation is thus accomplished with output transistor conduction time control.

Pure Cut, Low, Medium, Or High Blend

Logic selection of pure Cut, low, med, or high Blend is activated by selecting one of four touch key pads. Selecting the Touch/Entry key for pure Cut enables U4 Section A to select Y inputs for decoded binary output of U5. A logic "1" at Pin 17 reverse-biases CR98 turning ON Q9 and illuminating DS301. Selecting a Touch/Entry key for low, med, or high Blend enables U4 analog switch to select the correct Y inputs for decoded binary outputs of U5 Pins 14, 15, or 16.

Cut Enable - Pure

With the pure Cut light illuminated, the junction of R20, CR10, TP3 is high whenever the input to U1 (12-13) is low. That is, when the Cut footswitch or the hand chuck isolator switch input is active (low), the Cut cable line at TP3 is high and Cut RF circuitry is enabled.

Coag Enable

Activating the footswitch or hand chuck isolator circuit causes the input of Gate U1 (B) to go low and U1 (10), the output of this gate, to go high and U2 (4) produces a square wave and a negative output. This signal couples thru C16, CR43 to A4, starting a Coag signal generation (see Coagulation Power Generation, Page 5-1). The output of U1 (10) gates R62 and turns the control level pot ON at this time.

Blend

Blend (heavy) is a Coag signal at normal rate with RF Cut signal between the high energy damped sinusoids of Coag. (Lower repetition rate of Coag is used in moderate and low Blend modes.) In the Blend mode, the Cut level front panel knob controls power level and the Cut gate U1 (11) initiates control. The output

of U2 (4) and gate CR 12 thru CR13 initiates Cut Coag timing for each Blend mode. See the timing diagram on the schematic. This output drive U2 (4) and the output gates CR12, CR13 for a Cut Blend enable or U2 (3) for a Coag of Blend enable.

Hand Chuck Control - Isolator Switch

This circuitry provides electrical isolation and allows Cut or Coag control from an electrosurgery switching blade chuck.

A5 is a multivibrator driving the high frequency isolation transformer T2. When neither Cut or Coag is activated, the positive pulses at T2 (P6-1) and T2 (T6-3) produces DC signals on C2 and C3, respectively, de-activating Cut and Coag gates U1 (10) and U1 (11). When Cut or Coag is activated CR68 or CR69 shorts that polarity pulse drive as indicated by the diode polarity. The absence of a positive pulse to C1 or C2 causes the respective Cut or Coag gate of U1 (10) or U1 (11) to go positive.

L.E.D. Displays

The L.E.D. display board has three 7107C MOS IC's to convert the input P.C. level to seven segment decoders to drive the L.E.D. displays. Each 7107 generates a clock pulse used to generate the negative 5 volts by CD4009 hex-invertor. Full scale reading for Cut is 300, Coag 120, and Bipolar 22 (watts).

Dispersive Plate Cable Alarm

A6 is a multivibrator driving the high frequency isolation transformer T2. If either line in the dispersive cable is open, a positive pulse at test point TP9 thru CR54 latches the U1 (4) U1 (3) flip flop causing the cable fault red light to illuminate, gating U6 Pin 9 and driving SPK 1 audio tone, which disables the control logic at U1 (13) and U1 (9). When the cable-to-plate connection is complete, this positive pulse is shorted by transformer action thru CR70.

Power Supply

When AC power is applied, Q20 is biased full ON and Q21 is OFF enabling Q3. When AC power is removed, Q20 is OFF enabling Z2 and Q21, resetting Z3 counter which removes all drives. The power supply is conventional with a power transformer having three secondary windings, driving bridge rectifiers to produce +100V, +24V and -7V. A regulated +15V source is derived from the +24V supply.

When power is applied, Q8 is saturated, Q21 cuts OFF and the reset line of U3 Pin 12 is held low for binary counting. When power is turned OFF, Q8 is cut OFF and Q21 saturates biasing Q24 OFF, removing 5 volt supply from VR11 and supplying a logic "1" to U3 disabling the binary counter.

Fan Control (Option)

Depending on the wiring, the fan may be activated in one of the following three ways:

1. Jumper E3 to E1 to have the fan run when unit's power is ON.
2. Jumper E3 to E2 to have the fan run when unit is overheated.
3. Jumper E3 to E4 to have the fan run when unit is activated.

Circuit Description - Micro Bipolar

The Micro Bipolar consists basically of four circuit sections:

1. Isolator switch
2. Level, repetition rate, driver control
3. Output transistor
4. Audio

Isolator Switch

An explanation of circuit operation begins by depressing the Bipolar switch or the footswitch. Under this circuit condition, A1 oscillates as a multivibrator (MV) and its output is rectified at CR9. This DC voltage enables A2, the driver control comparator amplifier. This AC coupling provides for safety of any DC failure of comparator A1. If A1 shorts to +24, to ground or fails with an open output, the Bipolar unit (fail safe) will not be turned ON.

The Bipolar switching forcep's contacts short the output of T3 thru CR12. This reflects a short back to CR11 and inhibits the positive pulse at the junction of C17 and R29. This converts A1 from a long duration blocking oscillator to a MV capable of producing a power supply for enabling A2, the Bipolar driver amplifier.

Level Rep Rate Driver Control And Output

When A2 is enabled with voltage from the isolator switch circuit, A2 is biased so Q1 switches ON (low). This same action is also initiated with the footswitch. Transformer T1 now draws current, storing up energy in the primary. This portion of the cycle continues until R15 discharges C2 to a voltage more negative than Pin 2 of A2. When this occurs, the collector of Q1 switches high (OFF).

The stored energy in T1 generates a current drive in the secondary of T1 to Q3, turning it ON. Current is then drawn through R23 at a linear rate with respect to time. This produces a voltage ramp that is representative of the current through T2 and consequently the energy stored in T2. Then the voltage ramp through R8, R7, and CR2 becomes positive to Pin 2 of A2, the collector of Q1 switches ON (low), driving Q3 OFF through T1. The point on the ramp at which this occurs is modified by the settings of R2 full level adjustment and R3 the output control. With Q3 OFF, the energy stored previously in the primary of T2 is allowed to resonate with C10, producing a damped sinusoid at the output terminals and one cycle is completed.

Audio

A3 is an amplifier which drives the speaker. It is gated ON whenever the collector of Q1 switches to ground. The input pulse at Pin 3 comes from U3 Pin 15 binary counter.

5.2 SPECIFICATION

OUTPUT CHARACTERISTICS	P.P. VOLTAGE OPEN CIRCUIT	POWER WATTS 300 OHMS
CUT	1000 Max	300
COAG	5000 Max	120
BLEND	4000 Max	300

Cut Power Output L.E.D. Display

Power output ±15% at 5 watts of reading, ±7% full scale, ±.5 watt of calibration value with 300 Ohms load.

Coag Power Output L.E.D. Display

Power output ±15% at 5 watts of reading, ±4% full scale, ±.5 watt of calibration value with 300 Ohms load.

Output Wave Form

Cut

0.5 megahertz sinusoidal 100% duty cycle.

Coag

Sinusoidal with a repetition frequency of 31.35 KHz, 6.25% duty cycle.

Blend

Coag signal is added to the Cut signal to achieve Blend. The proportion of Coag signal power is approximately 1/3 of Cut, (i.e. 100W/300W). The Blend power is controlled by the Cut control knob. The four Cut touch key pads are labelled "Pure Cut" (with zero Blend), "Low" which produces one Coag burst (25% Coag repetition rate) then Cut power resumes during the remaining time. This sequence is repeated as long as the Cut button is depressed.

Blend (continued)	"Medium" is similar to "Low" except Coag has a 50% repetition rate. "High" has 100% (32 KHz) Coag repetition rate with Cut between Coag burst.
Output Isolation	Sink current 7 microamperes with 115VAC to active or dispersive. Isolation leakage to ground, 500 Ohms load, less than .5 watt Cut, less than 2.5 watts Coag.
Leakage Current 60 Cycle	Chassis to earth ground; third wire in line cord conducts less than 50 microamperes.
Crest Factor	
Cut	1.2
Coag	5.5
Output Power Decrease Without Patient Plate Return	98%
Duty Cycle	50% normal operation and full power (10 seonds ON, 10 seconds OFF) 17%; abnormal operation (no load and full power) (10 seconds ON, 50 seconds OFF).
Cooling	Convection cooled.
Indicators	.6" 7 segment LED displays for Cut and Coag power output, 9 distinctive lights indicating operating mode.
Audio Volume	Four (4) distinctive tones for indiction of Cut, Coag, Bipolar, and fault indicator.
Input Line Voltage	Standard model is 115VAC, 60 Hz. Multivoltage is 100, 115, 127, 220, 230, and 250 at 50/60 Hz. Switch selectable is available for export sales.
Input Watts	740 watts maximum. Idle 80 watts nominal.

Patient Cable Fault Indicator	Detects one of two or both conductors for open patient cable, activates cable fault indicator tone and disables the electrosurgical currents until the reset light is depressed to enable normal operation.

Bipolar Module Specifications

Power Output LED Display	Controls Bipolar power dial; power display to 22 watts. Power is ± 15% or ± 2 watts of reading, ± 3% of full scale, ± .5 watt of calibration.
Output Plug	Type 3: contacts, banana pin connector.
Indicators	.6" 7 segment LED display for power output, white light when coagulation is keyed ON by operator.
Output Wave Shape	32 KHz energy storage repetition rate. A damped sinusoid wave occurs when energy is discharged into a load resistance.
Output Voltage	Open circuit voltage, 900 Vp-p.
Frequency	Open circuit frequency, 0.5 MHz.
Power Output	22 watts full scale.
Power Input	24 volts nominal @ 2 Amps, @ full power.
Output Isolation	Sink current 7 microamperes with 115VAC to active or dispersive input. Radio Frequency dispersive leakage to ground, less than 1.25 watts Coag.

Physical Specifications - Total Unit

Weight	28 pounds (12.68 Kg)	
Size	HEIGHT	7 inches (17.78 cm)
	WIDTH	11 inches (27.96 cm)
	LENGTH	15 inches (38.12 cm)

SECTION 6

TROUBLESHOOTING FOR REPAIR

6.1 GENERAL INFORMATION

Some general observations for localizing trouble areas are given in this section. An understanding of the general block diagram functions and the schematic description should be used in conjunction with this troubleshooting guide.

CAUTION - HIGH RF AND DC VOLTAGE

The entire electrosurgery circuit may be operated up to the output transistors without high voltage on the output by removing high voltage fuse F1. When all circuits are properly functioning and base drive to the output transistors checked, the overall instrument may be tested for output operation.

6.2 PROBLEM AREA CIRCUIT ISOLATION

The front panel, hand switch (Birt-A-Switch) and an RF output indicator (Wattmeter, light bulb or arc to patient plate) may be utilized to isolate some trouble before detail circuit oscilloscope troubleshooting is required.

The following trouble symptoms that the unit may indicate and the reason for these symptoms will cover most major sections of the Model 774. The tests and reasoning will indicate other more detailed testing that may be required.

Power Switch - Circuit Breaker Cannot Be Turned On

Output power transistor(s) shorted. Therefore the high voltage is shorted to ground, tripping breaker. Replace transistor(s) on assembly #3410-26.

No Power Output

Cut and Coag audio and lights key ON. The power output stage is shorted and has blown the high voltage fuse F1. All circuits through to TP7 may be normal.

No Power Output

Cut audio and light keys ON, Coag does not. Note Coag audio is driven from driver TP7. Cut audio is not. This indicates a drive problem Q4-Q11 and the above output problems may also prevail.

Logic And Cut-Coag Control Circuitry Test

+15 power test from front panel: Pulling patient plate operates alarm. This light is illuminated from +15V supply. Failure to light: check +15V or isolator switch circuitry A6 and TP9.

Dispersive Alarm Works - No Cut Or Coag Keying Indication

Check isolator switch M.V. A5 at TP8. See schematic wave shape, M.V. OK - check footswitch input.

Cut Keys Light And Audio Sounds - No Coag

Check Coag logic through coag amplitude control only.

1. U1 (10) for ON-OFF with hand switch.

2. TP2 for a 32 micro seconds square wave which is the Coag repetition rated control signal. Check counter U3 logic U2.

3. TP6 the time duration (to 1.5 micro seconds) Coag amplitude signal to the driver.

Coag Keys Light And Audio Sounds - No Cut

Check Cut logic through Cut control only.

1. U1 (11) for ON-OFF with Cut hand switch.

2. TP3 enable Cut ON-OFF as above.

3. TP4 oscillates at 2 micro seconds, see schematic wave shape.

Micro Bipolar

The Bipolar is composed of M.V. driver and output with an isolator M.V. for turn ON keying. The audio and lamp drive are keyed from the drive output Q1. Wave shapes at key points are shown on schematic in Section 8.

L.E.D. Display - No Intensity

1. +5 volt power supply VR11.

2. -5 volt power supply Z301 - Z304.

SECTION 7

MAINTENANCE AND CALIBRATION

7.1 GENERAL INFORMATION

The Model 774 requires only the general maintenance of cleaning and the practice of general inspection of cord, cables and other electronic parts for good physical properties.

The calibration procedure is described in detail on the next page. Essentially the calibraion procedure for the major surgery unit consists of settings as follows:

1. Low power calibration for Cut mode
2. Low power calibration for Coag mode
3. Low power calibration for Blend mode
4. High power calibration for Cut
5. High power calibration for Blend - Low
6. High power calibration for Blend - Medium
7. High power calibration for Blend - High
8. High power calibration for Coag

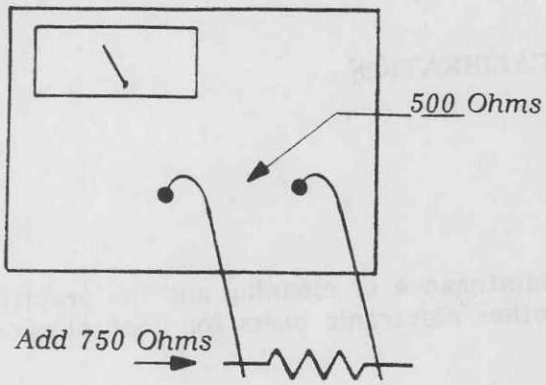
There is one calibration setting for the Bipolar unit which is explained in detail on the next page.

7.2 EQUIPMENT REQUIRED

Electrosurgery analyzer capable of 0 to 300 watts power reading at 300 Ohms. (See chart on follwoing page). NOTE: At 500 Ohms, a Dempsey, Model 443 may be used, shunting the input with a non-inductive 750 Ohms, 200 watt resistor, and using the following chart. (The resistor can be purchased from Ohmite, Type 270N vitreous enameled, Catalog Number 2410.)

7.3 CALIBRATION

500 Ohm
ESU Tester



TESTER READING		*REAL POWER*
180	=	*300*
150	=	*250*
120	=	*200*
60	=	*100*
30	=	*50*
15	=	*25*

$\frac{750}{500 + 750} = \frac{750}{1250}$ = *.6 of the real power read on the tester. The remainder of the power is dissipated in the 750 Ohms, therefore reading divided by .6 = Real Power.*

For example $\frac{60}{.6}$ watts reading = 100 watts real electrosurgery output power.

CALIBRATION: Load output to 300 Ohms - Active & Dispersive	*SET DIAL*	*Adjust R to watts output*
Coag - Low	*10 Watts*	*R250 10 Watts*
- High	*120 Watts*	*R77 120 Watts*
Cut - Low	*25 Watts*	*R39 25 Watts*
- High Cut	*300 Watts*	*R16 300 Watts*
- Blend, Low, Med. & High	*25 Watts*	*R173 & R176 25 Watts*
- Low Blend, High End	*300 Watts*	*R17 300 Watts*
- Med Blend, High End	*300 Watts*	*R18 300 Watts*
- High Blend, High End	*300 Watts*	*R19 300 Watts*
For above calibration potentiometers see PCB 3410-3 assembly drawing in Section 8		
MICRO BIPOLAR (Active Output Load to 500 Ohms)	*22 Watts*	*R202 22 Watts*
For above calibration potentiometers see PCB 3410-4 assembly drawing in Section 8		

7.4 CALIBRATION L.E.D. DISPLAY

CUT	With the Cut knob (S3) at maximum clockwise, adjust R214 (on display board) for 3.00 volts at J13-5. Adjust R303 on display assembly 3410-2 for a display of 300.
COAG	With the Coag knob (S4) at maximum clockwise, adjust R213 (on the display board) for 1.20 volts at J13-7. Adjust R305 on display assembly 3410-2 for a display of 120.
MICRO BIPOLAR	With R3 maximum clockwise, adjust R249 on 3410-4 micro bipolar assembly for 2.2 volts at P15-5. Adjust R308 on display assembly 3410-2 for a display of 22.

SECTION 8

DRAWINGS AND PARTS LIST

REVISIONS					
REV.	DESCRIPTION	DATE	DRAWN	CHKD.	APPD
C	ECO # 4543-7 REDRAWN	8-20-84	[illegible]	[illegible]	[illegible]

MODEL 774
ELECTROSURGERY GENERATOR

1. IN REGARDS TO ITEM 6: UPDATE THE REV. LEVEL AND THE PACKING LIST ITSELF FOR ALL CHANGES WHICH EFFECT THE ITEMS INCLUDED WITH THIS UNIT.

NOTES:

-A	ITEM	QTY	PART No.	DESCRIPTION	MFG/SPEC
6	8	6	C 730	DISPERSIVE PAD ASSY	
1	7	1	774 -M	MANUAL	
⚠1	6	1	MODEL 774 PACKING LIST REV N/C		
1	5	1	A 19939-142	SHIPPING BOX, 22 1/4" x 17-1/2" x 16"	
6	4	6	A 718 VDS	STERILE HANDSWITCHABLE PENCIL	
1	3	1	B 674-40	PHONE PLUG CABLE ADAPTER	
1	2	—	D 3410-36A	FINAL TEST ASS'Y 240V	
—	1	1	D 3410-36	FINAL TEST ASS'Y 120V	

USED ON 774-7

DRAWN [illegible] DATE 8-20-84

CHKD. [illegible] 9-11-84

APPD. [illegible] 9-10-84

SCALE —

TOLERANCE EXCEPT AS NOTED
ANGLES ±
FRACTIONS ±
DECIMALS .XX ±
.XXX ±

NEXT ASSY —

FINAL ASS'Y
E.S.G.
MODEL 774 E-A

MAT'L —

FINISH —

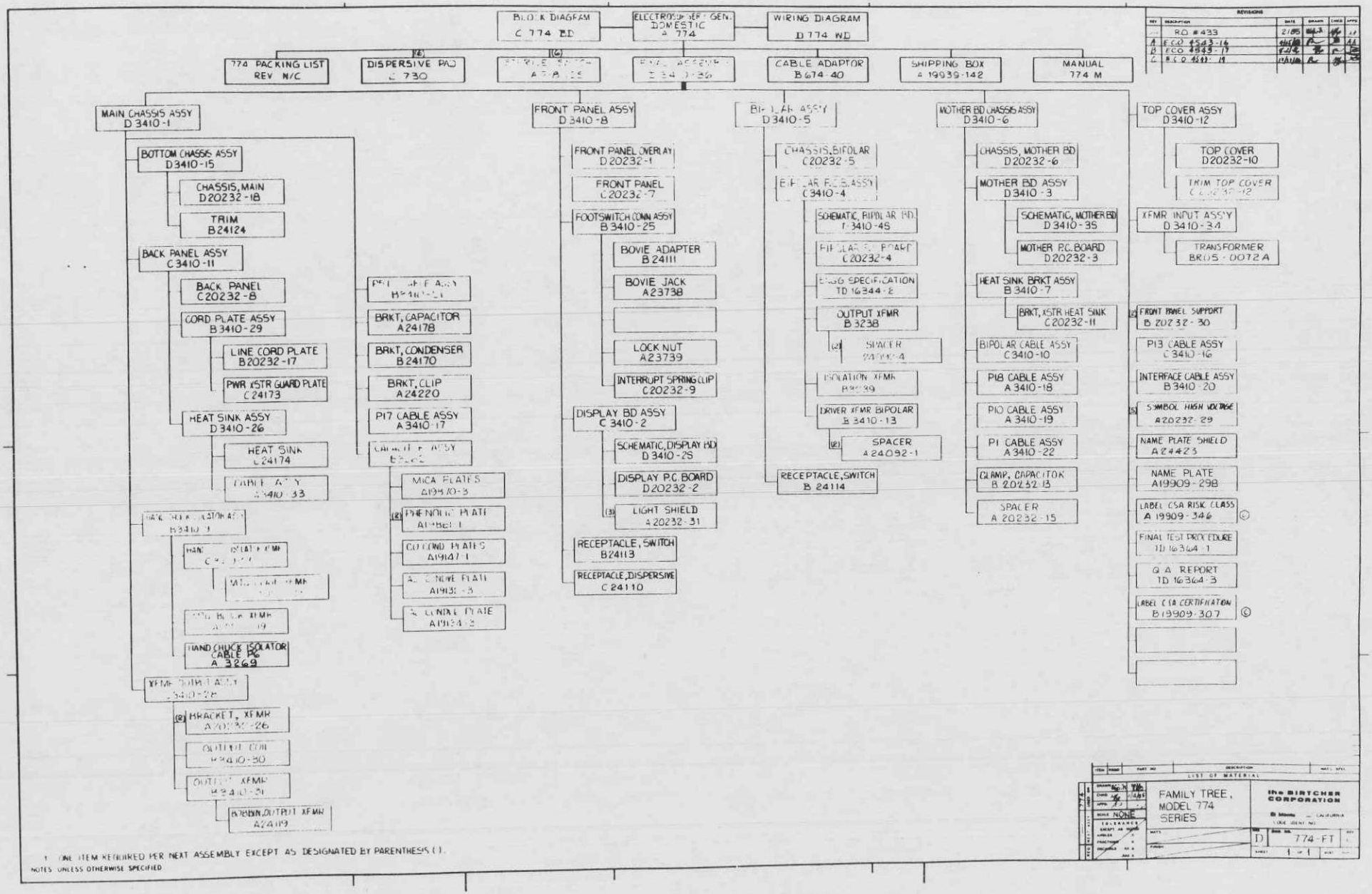
the BIRTCHER CORPORATION
LOS ANGELES — CALIFORNIA
CODE IDENT NO.

DWG NO. A 774 E-A

REV. C

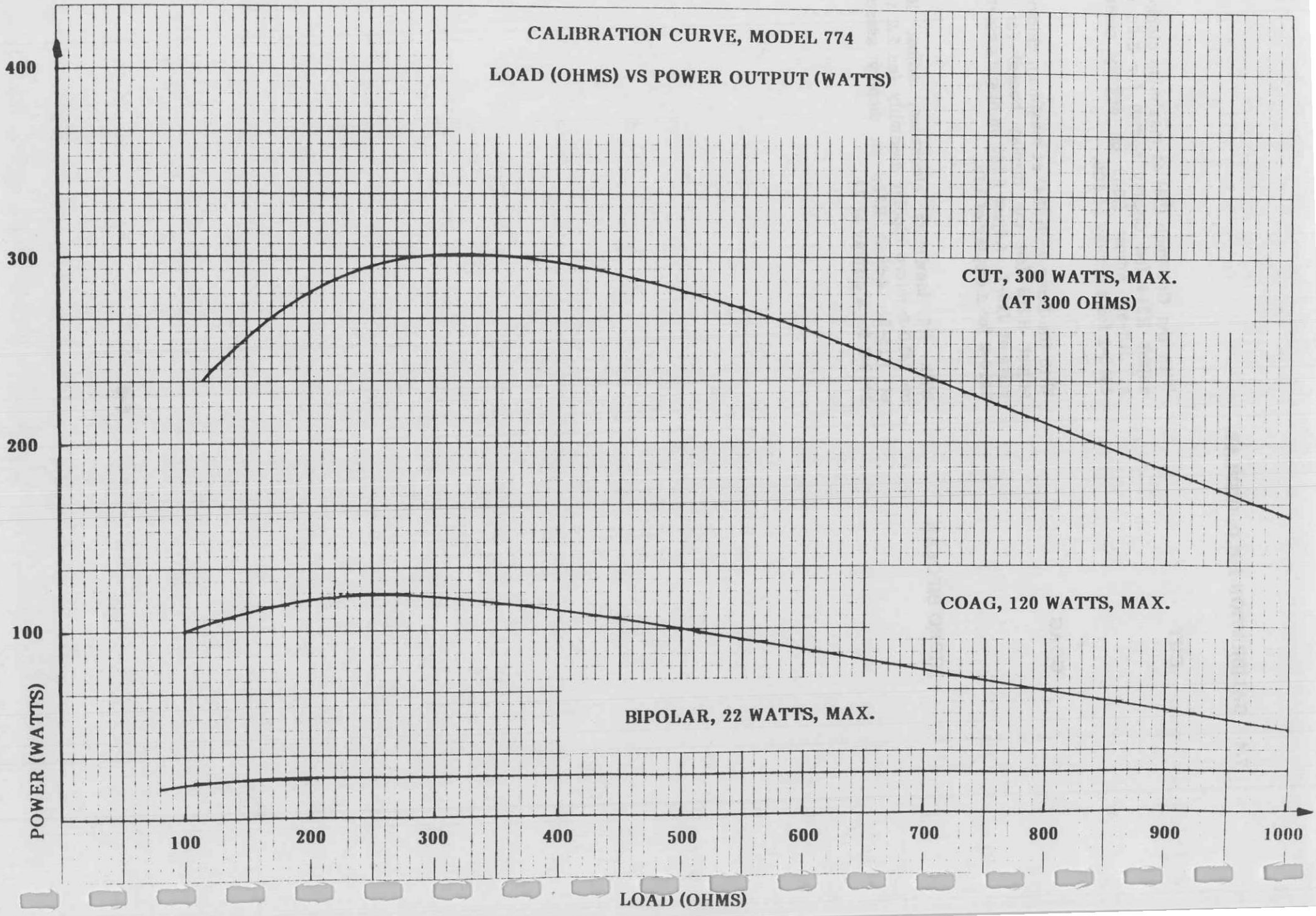
SHEET 1 OF 1

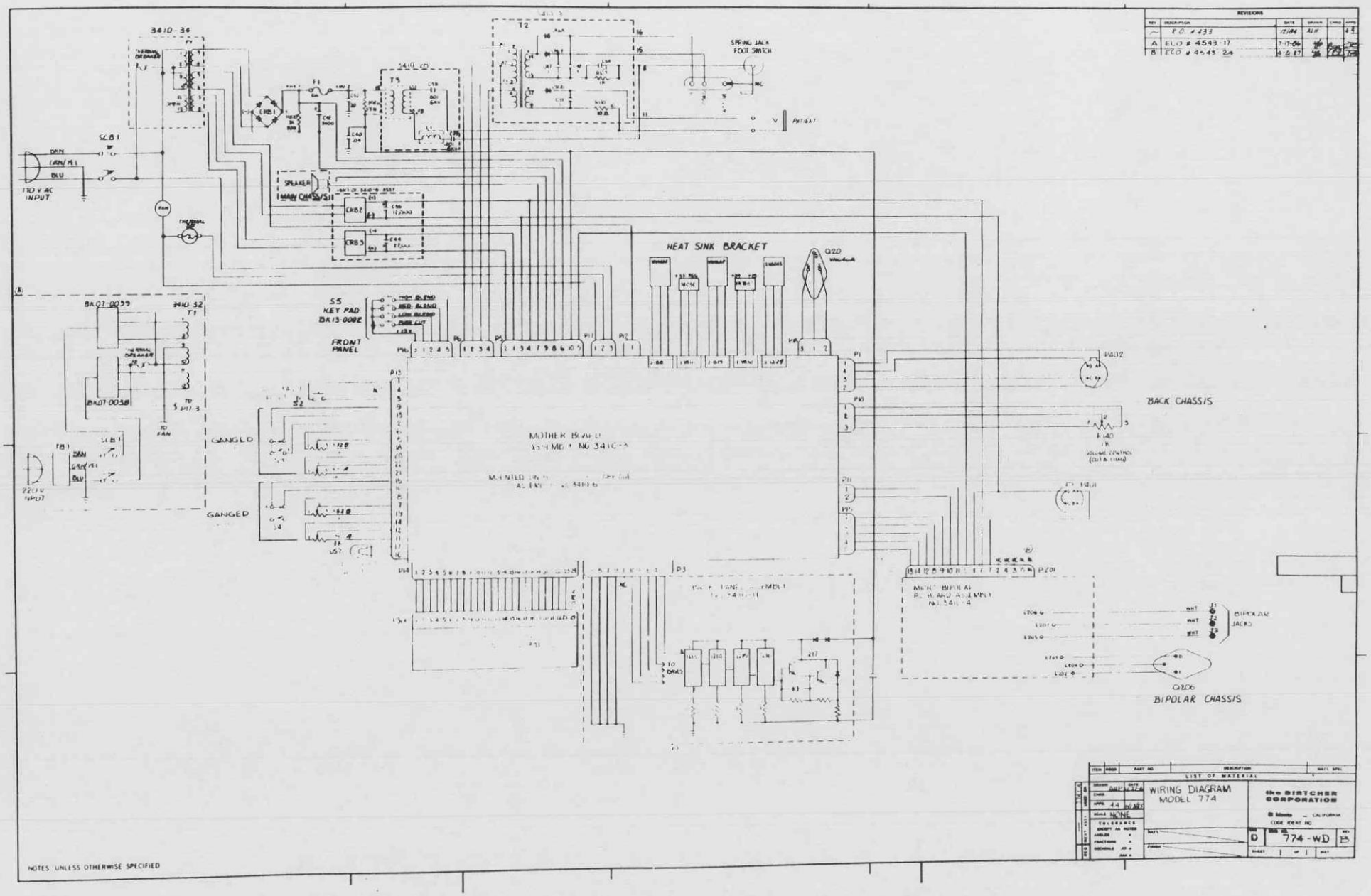
DIST.

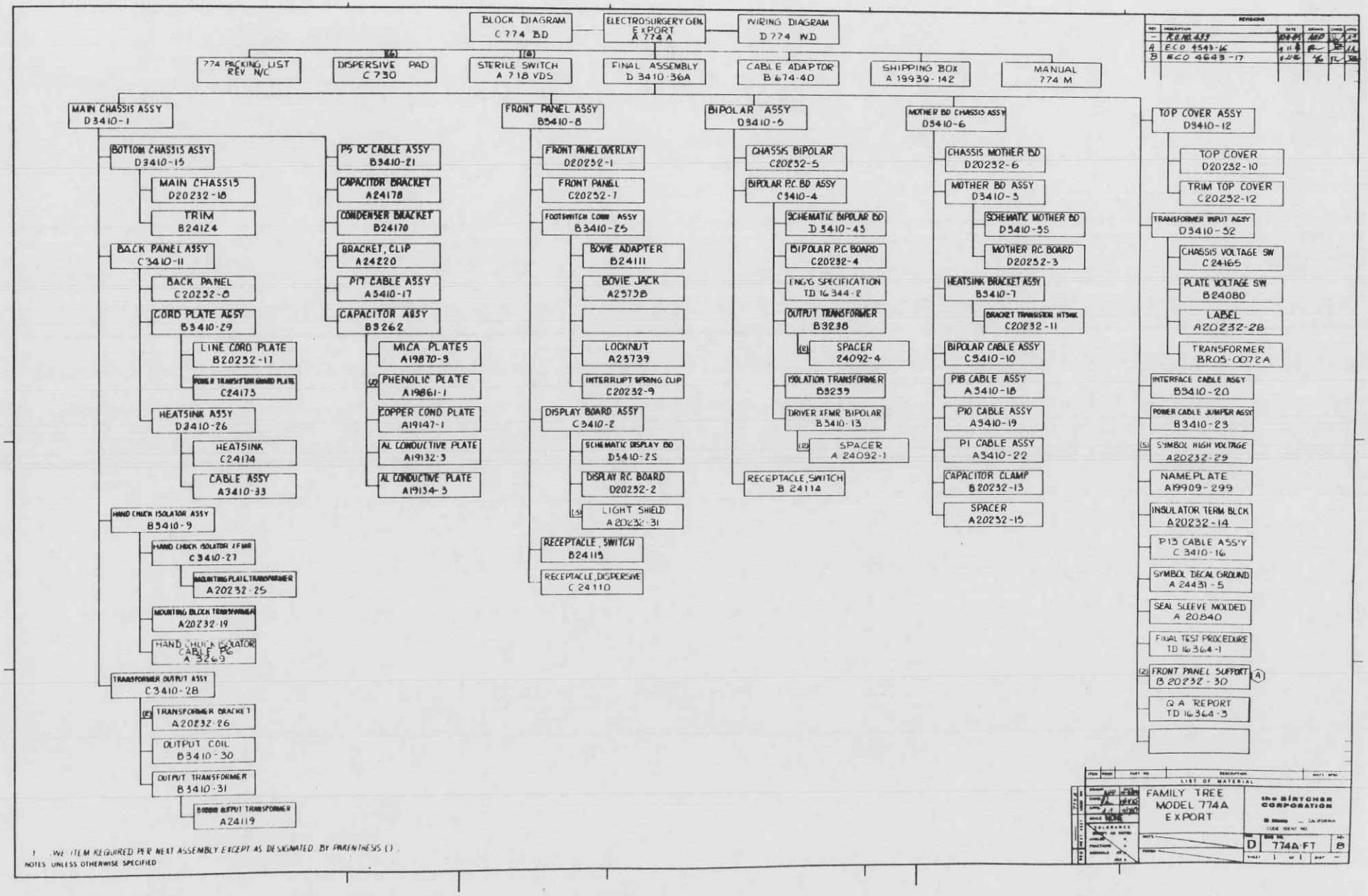

BLOCK DIAGRAM C 774 BD
ELECTROSURGERY GEN. DOMESTIC A 774
WIRING DIAGRAM D 774 WD
774 PACKING LIST REV N/C
DISPERSIVE PAD C 730
CABLE ADAPTOR B 674-40
SHIPPING BOX A 19939-142
MANUAL 774 M
MAIN CHASSIS ASSY D 3410-1
FRONT PANEL ASSY D 3410-8
BIPOLAR ASSY D 3410-5
MOTHER BD CHASSIS ASSY D 3410-6
TOP COVER ASSY D 3410-12
BOTTOM CHASSIS ASSY D 3410-15
CHASSIS, MAIN D20232-18
TRIM B24124
BACK PANEL ASSY C 3410-11
BACK PANEL C20232-8
CORD PLATE ASSY B 3410-29
LINE CORD PLATE B20232-17
PWR XSTR GUARD PLATE C24173
HEAT SINK ASSY D 3410-26
HEAT SINK C24174
CABLE ASSY A 3410-33
HAND CHUCK ISOLATOR ASSY B 3410-9
HAND ISOLATOR XFMR C 24109
MATCHING XFMR A 24119
HAND ISOLATOR XFMR A 24119
HAND CHUCK ISOLATOR CABLE P6 A 3269
XFMR OUTPUT ASSY C 3410-32M
(2) BRACKET, XFMR A 20232-26
OUTPUT COIL B 3410-30
OUTPUT XFMR B 3410-31
TRANSFORMER, OUTPUT XFMR A 24119
PCB ASSY B 3410-24
BRKT, CAPACITOR A 24178
BRKT, CONDENSER B 24170
BRKT, CLIP A 24220
P17 CABLE ASSY A 3410-17
CAPACITOR ASSY B 24112
MICA PLATES A 19910-3
(2) PHENOLIC PLATE A 19911-1
CO COND PLATES A 19907-1
A CONDUCTOR PLATE A 19913-3
B CONDUCTOR PLATE A 19914-3
FRONT PANEL OVERLAY D 20232-1
FRONT PANEL C 20232-7
FOOTSWITCH CONN ASSY B 3410-25
BOVIE ADAPTER B 24111
BOVIE JACK A 23738
LOCK NUT A 23739
INTERRUPT SPRING CLIP C 20232-9
DISPLAY BD ASSY C 3410-2
SCHEMATIC, DISPLAY BD D 3410-28
DISPLAY P.C. BOARD D 20232-2
(3) LIGHT SHIELD A 20232-31
RECEPTACLE, SWITCH B 24113
RECEPTACLE, DISPERSIVE C 24110
CHASSIS, BIPOLAR C 20232-5
BIPOLAR P.C.B. ASSY C 3410-4
SCHEMATIC, BIPOLAR BD D 3410-45
BIPOLAR P.C. BOARD C 20232-4
EDGE SPECIFICATION TD 16344-8
OUTPUT XFMR B 3238
(2) SPACER A 24092-4
ISOLATION XFMR B 3239
DRIVER XFMR BIPOLAR B 3410-13
(2) SPACER A 24092-1
RECEPTACLE, SWITCH B 24114
CHASSIS, MOTHER BD D 20232-6
MOTHER BD ASSY D 3410-3
SCHEMATIC, MOTHER BD D 3410-35
MOTHER P.C. BOARD D 20232-3
HEAT SINK BRKT ASSY B 3410-7
BRKT, XSTR HEAT SINK C 20232-11
BIPOLAR CABLE ASSY C 3410-10
P18 CABLE ASSY A 3410-18
P10 CABLE ASSY A 3410-19
P1 CABLE ASSY A 3410-22
CLAMP, CAPACITOR B 20232-13
SPACER A 20232-15
TOP COVER D20232-10
TRIM TOP COVER C 20232-12
XFMR INPUT ASSY D 3410-34
TRANSFORMER BR05-0072A
(2) FRONT PANEL SUPPORT B 20232-30
P13 CABLE ASSY C 3410-16
INTERFACE CABLE ASSY B 3410-20
(5) SYMBOL HIGH VOLTAGE A 20232-29
NAME PLATE SHIELD A 24423
NAME PLATE A 19909-298
LABEL CSA RISK CLASS A 19909-346 ©
FINAL TEST PROCEDURE TD 16364-1
Q A REPORT TD 16364-3
LABEL CSA CERTIFICATION B 19909-307 ©
REVISIONS
REV DESCRIPTION DATE DRAWN CHKD APPD
... RO # 433 2/85
A ECO 4543-16
B ECO 4943-19
C ECO 4943-19
LIST OF MATERIAL
FAMILY TREE, MODEL 774 SERIES
the BIRTCHER CORPORATION
SCALE NONE
D 774-FT
SHEET 1 OF 1

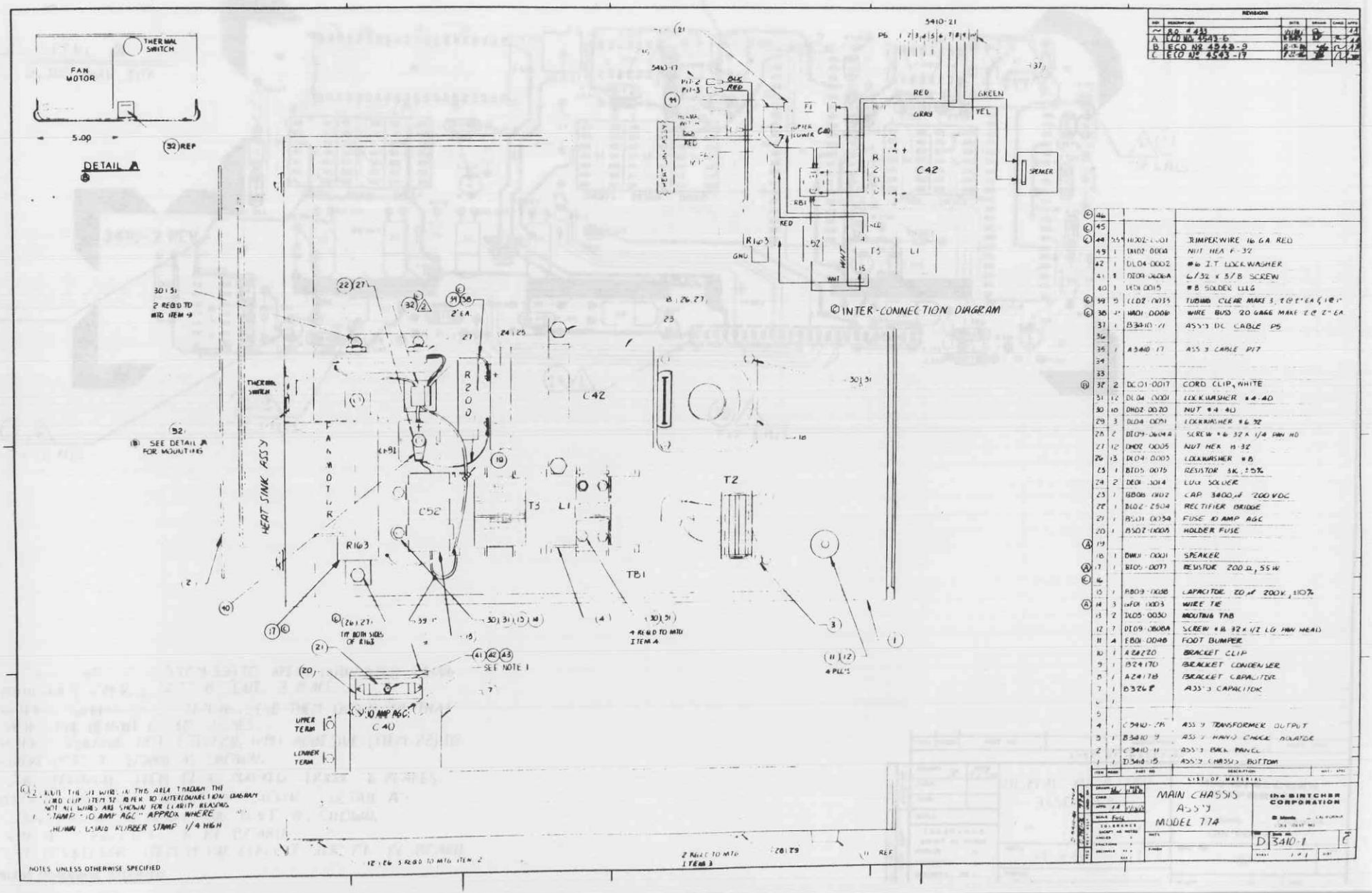
1. ONE ITEM REQUIRED PER NEXT ASSEMBLY EXCEPT AS DESIGNATED BY PARENTHESIS ( ).

NOTES UNLESS OTHERWISE SPECIFIED


CALIBRATION CURVE, MODEL 774
LOAD (OHMS) VS POWER OUTPUT (WATTS)
CUT, 300 WATTS, MAX.
(AT 300 OHMS)
COAG, 120 WATTS, MAX.
BIPOLAR, 22 WATTS, MAX.
400
300
200
100
POWER (WATTS)
100
200
300
400
500
600
700
800
900
1000
LOAD (OHMS)


REVISIONS
P.C. # 433
ECO # 4543-17
ECO # 4543-24
3410-36
3410-00
T2
T3
SPRING JACK FOOT SWITCH
PATIENT
SCB1
110 V AC INPUT
SPEAKER
MAIN CHASSIS
CRB1
CRB2
CRB3
HEAT SINK BRACKET
Q20
BK07-0039
HW 52
T1
BK07-0038
TO FAN
55 KEY PAD BK13-0082
FRONT PANEL
GANGED
GANGED
MOTHER BOARD ASSEMBLY NO. 3410C-A
MOUNTED IN
AS PART OF 3410-B
P402
R 140
1K
VOLUME CONTROL
BACK CHASSIS
MONO BIPOLAR P.C. BOARD ASSEMBLY NO. 3410-4
P201
BIPOLAR JACKS
Q206
BIPOLAR CHASSIS
TO BRAKE
LIST OF MATERIAL
WIRING DIAGRAM
MODEL 774
the BIRTCHER CORPORATION
774-WD
NOTES: UNLESS OTHERWISE SPECIFIED


BLOCK DIAGRAM C 774 BD
ELECTROSURGERY GEN EXPORT A 774 A
WIRING DIAGRAM D 774 WD
774 PACKING LIST REV N/C
DISPERSIVE PAD C 730
(6) STERILE SWITCH A 718 VDS
FINAL ASSEMBLY D 3410-36A
CABLE ADAPTOR B 674-40
SHIPPING BOX A 19939-142
MANUAL 774 M
MAIN CHASSIS ASSY D3410-1
BOTTOM CHASSIS ASSY D3410-15
MAIN CHASSIS D20232-18
TRIM B24124
BACK PANEL ASSY C3410-11
BACK PANEL C20232-8
CORD PLATE ASSY B3410-29
LINE CORD PLATE B20232-17
POWER TRANSISTOR GUARD PLATE C24173
HEATSINK ASSY D3410-26
HEATSINK C24174
CABLE ASSY A3410-33
HAND CHUCK ISOLATOR ASSY B3410-9
HAND CHUCK ISOLATOR XFMR C3410-27
MOUNTING PLATE, TRANSFORMER A20232-25
MOUNTING BLOCK TRANSFORMER A20232-19
HAND CHUCK ISOLATOR CABLE PC A 3269
TRANSFORMER OUTPUT ASSY C3410-28
(2) TRANSFORMER BRACKET A20232-26
OUTPUT COIL B3410-30
OUTPUT TRANSFORMER B3410-31
BOBBIN OUTPUT TRANSFORMER A24119
P5 DC CABLE ASSY B3410-21
CAPACITOR BRACKET A24178
CONDENSER BRACKET B24170
BRACKET, CLIP A24220
P17 CABLE ASSY A3410-17
CAPACITOR ASSY B3262
MICA PLATES A19870-3
(2) PHENOLIC PLATE A19861-1
COPPER COND PLATE A19147-1
AL CONDUCTIVE PLATE A19132-3
AL CONDUCTIVE PLATE A19134-3
FRONT PANEL ASSY B3410-8
FRONT PANEL OVERLAY D20232-1
FRONT PANEL C20232-7
FOOTSWITCH CORD ASSY B3410-25
BOVIE ADAPTER B24111
BOVIE JACK A25738
LOCKNUT A25739
INTERRUPT SPRING CLIP C20232-9
DISPLAY BOARD ASSY C3410-2
SCHEMATIC DISPLAY BD D3410-25
DISPLAY P.C. BOARD D20232-2
(5) LIGHT SHIELD A20232-31
RECEPTACLE, SWITCH B24113
RECEPTACLE, DISPERSIVE C 24110
BIPOLAR ASSY D3410-5
CHASSIS BIPOLAR C20232-5
BIPOLAR P.C. BD ASSY C3410-4
SCHEMATIC BIPOLAR BD D 3410-45
BIPOLAR P.C. BOARD C20232-4
ENGG SPECIFICATION TD 16344-2
OUTPUT TRANSFORMER B3238
(2) SPACER 24092-4
ISOLATION TRANSFORMER B3239
DRIVER XFMR BIPOLAR B3410-13
(2) SPACER A 24092-1
RECEPTACLE, SWITCH B 24114
MOTHER BD CHASSIS ASSY D3410-6
CHASSIS MOTHER BD D20232-6
MOTHER BD ASSY D3410-3
SCHEMATIC MOTHER BD D 3410-35
MOTHER P.C. BOARD D20232-3
HEATSINK BRACKET ASSY B3410-7
BRACKET TRANSISTOR HTSNK C20232-11
BIPOLAR CABLE ASSY C3410-10
P18 CABLE ASSY A3410-18
P10 CABLE ASSY A3410-19
P1 CABLE ASSY A3410-22
CAPACITOR CLAMP B20232-13
SPACER A20232-15
TOP COVER ASSY D3410-12
TOP COVER D20232-10
TRIM TOP COVER C20232-12
TRANSFORMER INPUT ASSY D3410-32
CHASSIS VOLTAGE SW C 24165
PLATE VOLTAGE SW B24080
LABEL A20232-28
TRANSFORMER BR05-0072A
INTERFACE CABLE ASSY B3410-20
POWER CABLE JUMPER ASSY B3410-23
(5) SYMBOL HIGH VOLTAGE A20232-29
NAMEPLATE A19909-299
INSULATOR TERM BLCK A20232-14
P13 CABLE ASS'Y C 3410-16
SYMBOL DECAL GROUND A 24431-5
SEAL SLEEVE MOLDED A 20840
FINAL TEST PROCEDURE TD 16364-1
(2) FRONT PANEL SUPPORT B 20232-30 (4)
Q A REPORT TD 16364-3
REVISIONS
- RELEASE 4-11-85 ABD
A ECO 4543-16 4-11-85 RC
B ECO 4643-17 9-4-86 MG
1 WE ITEM REQUIRED PER NEXT ASSEMBLY EXCEPT AS DESIGNATED BY PARENTHESIS ( ).
NOTES UNLESS OTHERWISE SPECIFIED
LIST OF MATERIAL
FAMILY TREE MODEL 774A EXPORT
the BIRTCHER CORPORATION
D 774A-FT B



REVISIONS				
	DESCRIPTION	DATE		
~	ECO # 433			
A	ECO NO 4543-6			
B	ECO NO 4543-9			
C	ECO NO 4543-19			

	46			
	45			
	44	55"	HOOZ-0001	JUMPER WIRE 16 GA RED
	43	1	DH02 0004	NUT HEX F-32
	42	1	DL04 0002	#6 I.T. LOCKWASHER
	41	1	DE09 0606A	6/32 x 3/8 SCREW
	40	1	DE01 0015	#8 SOLDER LUG
	39	5"	CL02 0035	TUBING CLEAR MARK 3, 2@1", 2@1½", 1@1"
	38	22"	WA01 0006	WIRE BUSS 20 GAGE MARK 2@2", 2@1" EA
	37	1	B3410-11	ASS'Y DC CABLE P5
	36			
	35	1	A3410-17	ASS'Y CABLE P17
	34			
	33			
	32	2	DC01-0017	CORD CLIP, WHITE
	31	12	DL04 0001	LOCKWASHER #4-40
	30	10	DH02 0020	NUT #4 40
	29	3	DL04 0051	LOCKWASHER #6 32
	28	2	DE09-0614A	SCREW #6 32 x 1/4 PAN HD
	27	12	DH02 0005	NUT HEX #8 32
	26	13	DL04 0003	LOCKWASHER #8
	25	1	BE05 0075	RESISTOR 3K, ±5%
	24	2	DE01 3014	LUG SOLDER
	23	1	BB08 1802	CAP 3400 μF 200 VDC
	22	1	BL02-2504	RECTIFIER BRIDGE
	21	1	BS01 0034	FUSE 10 AMP AGC
	20	1	BS02-0005	HOLDER FUSE
	19			
	18	1	SW11 0001	SPEAKER
	17	1	BE05-0077	RESISTOR 200 Ω, 55 W
	16			
	15	1	PB09-0038	CAPACITOR 20 μF 200V, ±10%
	14	3	WF01 0003	WIRE TIE
	13	2	DL05-0030	MOUNTING TAB
	12	7	DE09-0608A	SCREW #8 32 x 1/2 LG PAN HEAD
	11	4	FB01-0048	FOOT BUMPER
	10	1	A24220	BRACKET CLIP
	9	1	B24170	BRACKET CONDENSER
	8	1	A24178	BRACKET CAPACITOR
	7	1	B3248	ASS'Y CAPACITOR
	6	1		
	5			
	4	1	C3410-18	ASS'Y TRANSFORMER OUTPUT
	3	1	B3410-9	ASS'Y HARN CHASS BLKHDR
	2	1	C3410-11	ASS'Y BACK PANEL
	1	1	D3410-15	ASS'Y CHASSIS BOTTOM

ITEM	QUAN	PART NO	DESCRIPTION	MAT'L SPEC

LIST OF MATERIAL

MAIN CHASSIS ASS'Y
MODEL 774

the BIRTCHER CORPORATION

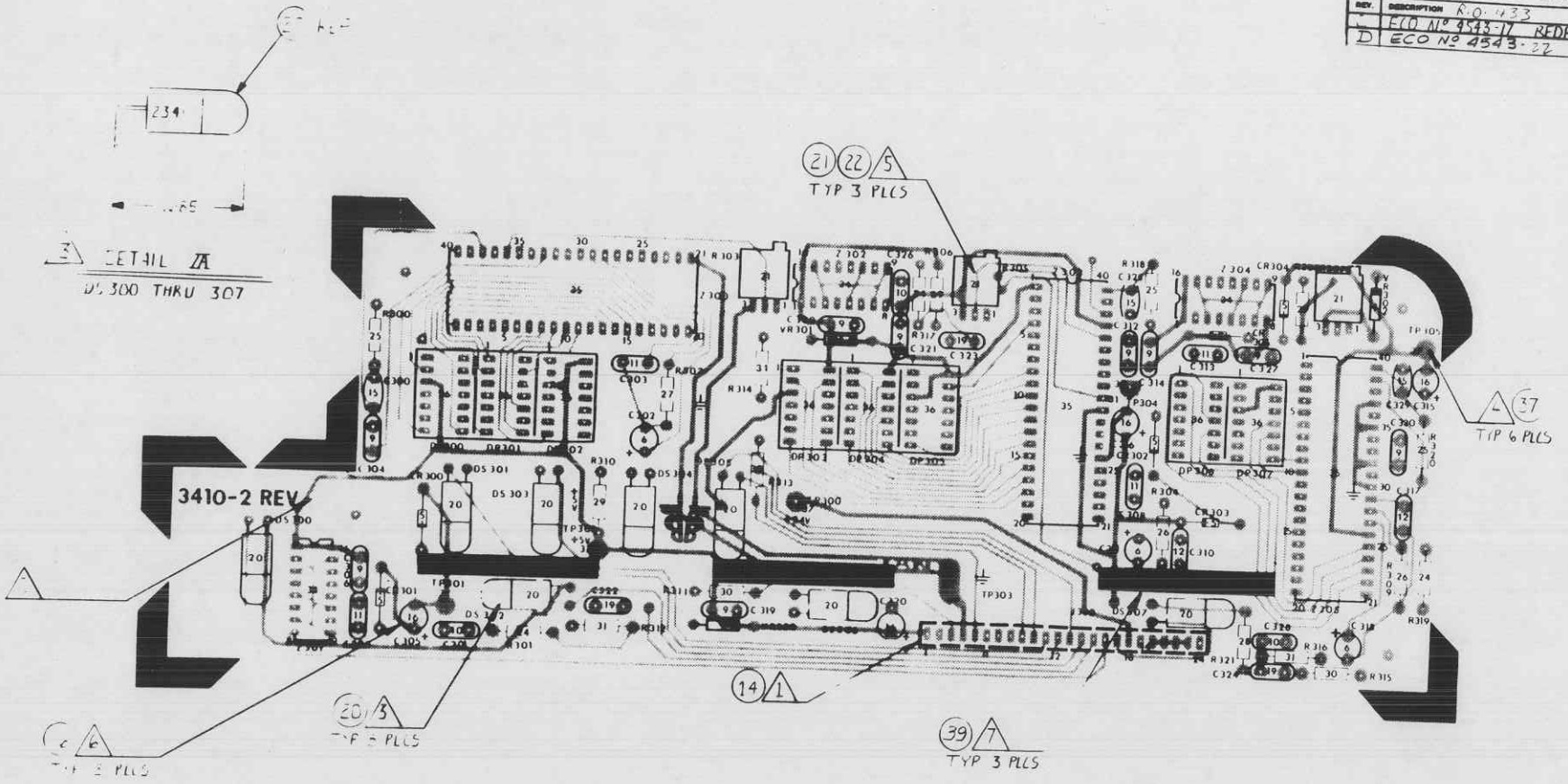
D 3410-1

NOTES UNLESS OTHERWISE SPECIFIED

(C) 2 ROUTE THIS WIRE IN THIS AREA THROUGH THE CORD CLIP ITEM 32 REFER TO INTERCONNECTION DIAGRAM NOT ALL WIRES ARE SHOWN FOR CLARITY REASONS

1 STAMP "10 AMP AGC" APPROX WHERE SHOWN USING RUBBER STAMP 1/4 HIGH

REVISIONS					
REV.	DESCRIPTION	DATE	DRAWN	CHKD.	APPD
-	ECO Nº 4543-17 REDRAWN R.O. 1133	8.29.86	JE	[illegible]	[illegible]
D	ECO Nº 4543-22	2-26-87	MC	[illegible]	[illegible]



3. [illegible] (ITEM 39) TO AREAS INDICATED USING ADHESIVE (ITEM 40), [illegible] 3 PLACES.
4. AFTER [illegible] ITEM 16. BEND THEM DOWN SO THAT THEIR MAX. HEIGHT IS .50 INCHES.
5. AFTER SOLDERING PCTS (ITEM 21), APPLY ADHESIVE (ITEM 22) TO [illegible] PCTS TO BOARD AS SHOWN.
6. INSTALL TERMINAL, ITEM 37 AS MARKED TPXXX. 6 PLACES.
8. PRESS-FIT [illegible] (ITEM 20) AS SHOWN IN DETAIL 'A'. INSTALL [illegible] BOARD AND PLACE AS SHOWN.
12. [illegible] AS REFERENCE ON PC BOARD.
[illegible] CONNECTOR (ITEM 19 ON CIRCUIT SIDE OF PC BOARD.

NOTES UNLESS OTHERWISE SPECIFIED

ITEM	REQD	PART NO	DESCRIPTION	MATL SPEC
			LIST OF MATERIAL	

DRAWN	DATE	DISPLAY P.C. BOARD ASSEMBLY	the BIRTCHER CORPORATION
CHKD.			El Monte — CALIFORNIA
APPD.			CODE IDENT NO.
SCALE			
TOLERANCE EXCEPT AS NOTED: ANGLES ±, FRACTIONS ±, DECIMALS .XX ±,		MATL [illegible]	DWG NO. [illegible] REV -
		FINISH	SHEET [illegible]

PARTS LIST

NAME	VALUE	RATING	TYPE	REF. DESIGNATOR	ITEM	PART NO.	QTY
P.C. BOARD					1	D 20232-2	1
SCHEMATIC					2	D 3410-2S	REF
					3		
DIODE	IN 753A		ZENER	VR 300 - 302	4	BL03-753A	3
DIODE	IN 914B			CR 300 - 305	5	BL12 914B	6
CAPACITOR	.22 μF	30 V		C 302, 311, 318	6	BB13-0014	3
					7		
					8		
CAPACITOR	.1 μF	63V		C 304, 306, 309, 312, 314, 319, 321, 327, 330	9	BB19-104K	9
CAPACITOR	.01 μF	63V		C 301, 326, 328	10	BB19-103K	3
CAPACITOR	.047 μF	63V		C 303, 307, 308, 313	11	BB19-473K	4
CAPACITOR	.47 μF	63V		C 310, 317	12	BB19-474K	2
CONNECTOR	24 PIN			J 300	14	BU05-0078	1
CAPACITOR	100 PF	500V ±5%		C 300, 325, 329	15	BB14-101J	3
CAPACITOR	10 μF	20V ±80%		C 305, 315, 316, 320	16	BB13-0006	4
					17		
					18		
CAPACITOR	.001 μF	63V		C 322 - 324	19	BB19-102K	3
LAMP			2341	DS 300 - 307	20	BF01-0004	8
POTENTIOMETER	10K Ω		20T	R 303, 305, 307	21	BI06-0106	3
ADHESIVE		BLK	RTV 732	USED ON POTS	22	OA01-0041	A/R
					23		
RESISTOR	1 MΩ	1/8W, 1%		R 301, 317, 319	24	BI11-1004F	3
RESISTOR	100 KΩ	1/4W, 5%		R 300, 318, 320	25	BI12-104J	3
RESISTOR	47 KΩ	1/4W, 5%		R 304, 309	26	BI12-473J	2
RESISTOR	470 KΩ	1/4W, 5%		R 302	27	BI12-474J	1
RESISTOR	22 Ω	1/4W, 5%		R 321	28	BI12-220J	1
RESISTOR	1K Ω	1/4W, 5%		R 306, 308, 310	29	BI12-102J	3
RESISTOR	499K Ω	1/8W, 1%		R 311, 313, 315	30	BI11-4993F	3
RESISTOR	49.9K Ω	1/8W, 1%		R 312 314 316	31	BI11-4992F	3
					32		
					33		
I.C.	4009 BFX			Z 301 302 304	34	BL15-4009BFX	3
I.C.	7107CPL			Z 303 305	35	BL17-7107CPL	3
LED DISPLAY	SOMY 7751		COMM. ANODE	DP 300 - 307	36	BL07 7751	8 ●
TEST POINT				TP 300 - 305	37	BU06-0040	6
LIGHT SHIELD			.20" THK x 1.546	FOR DS 302, 306, 307	39	D 20232-31	3 ◐
ADHESIVE				FOR DS 302, 306, 307	40	OA01-0048	A/K ◐

REVISIONS

REV.	DESCRIPTION	DEPT	DATE	DRAWN	CHKD	APPD
	— SEE SHEET 1 OF 2 —					

NAME	VALUE	RATING	TYPE	REF. DESIGNATOR	ITEM	PART NO.	QTY

ITEM	REQD.	PART NO.	DESCRIPTION	MAT'L SPEC
			LIST OF MATERIAL	

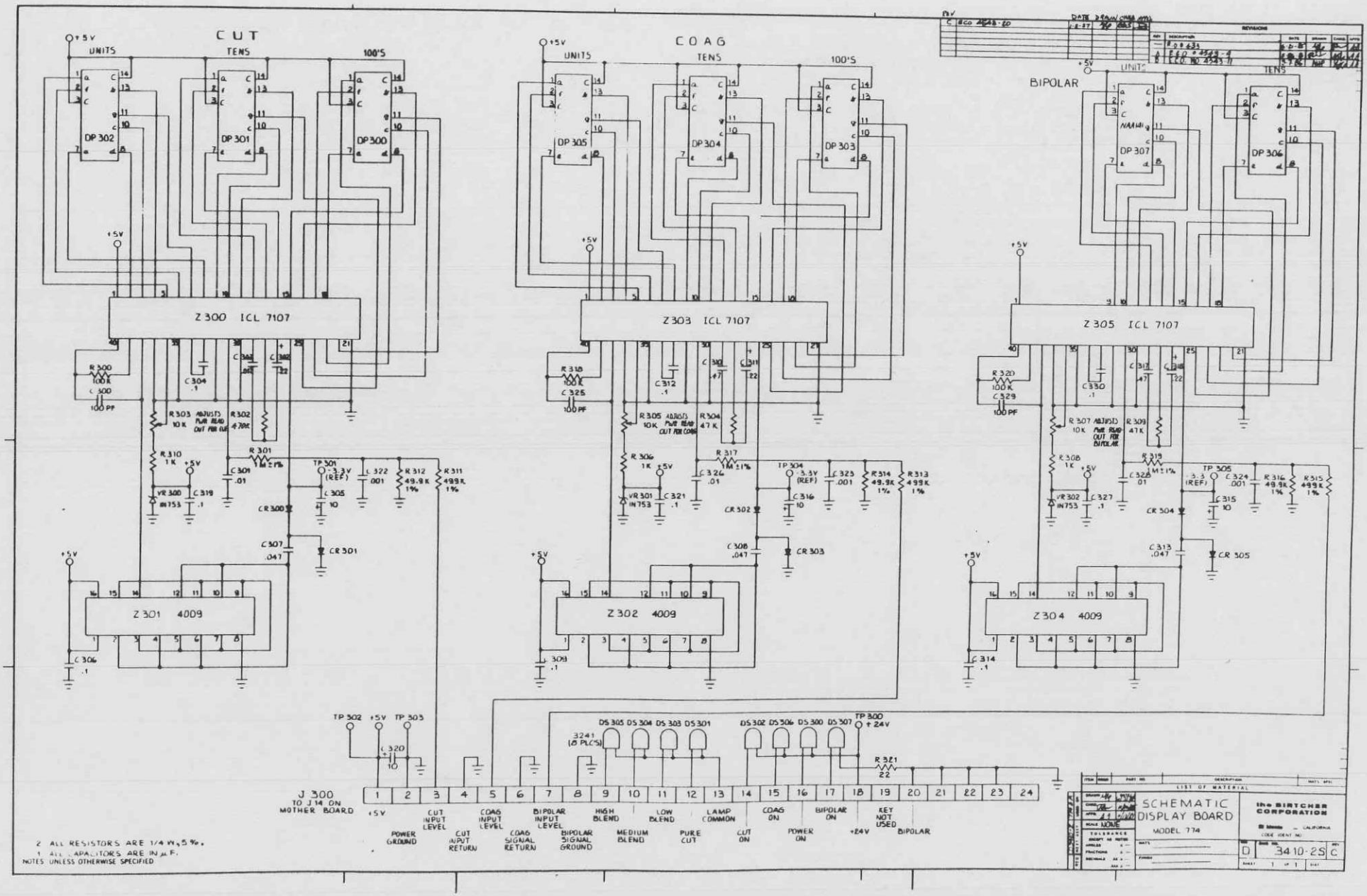
NEXT ASSY USED ON

DRAWN AJK DATE 7-5-77
CHKD.
APPD.
SCALE
TOLERANCE EXCEPT AS NOTED
ANGLES ±
FRACTIONS ±
MAT'L

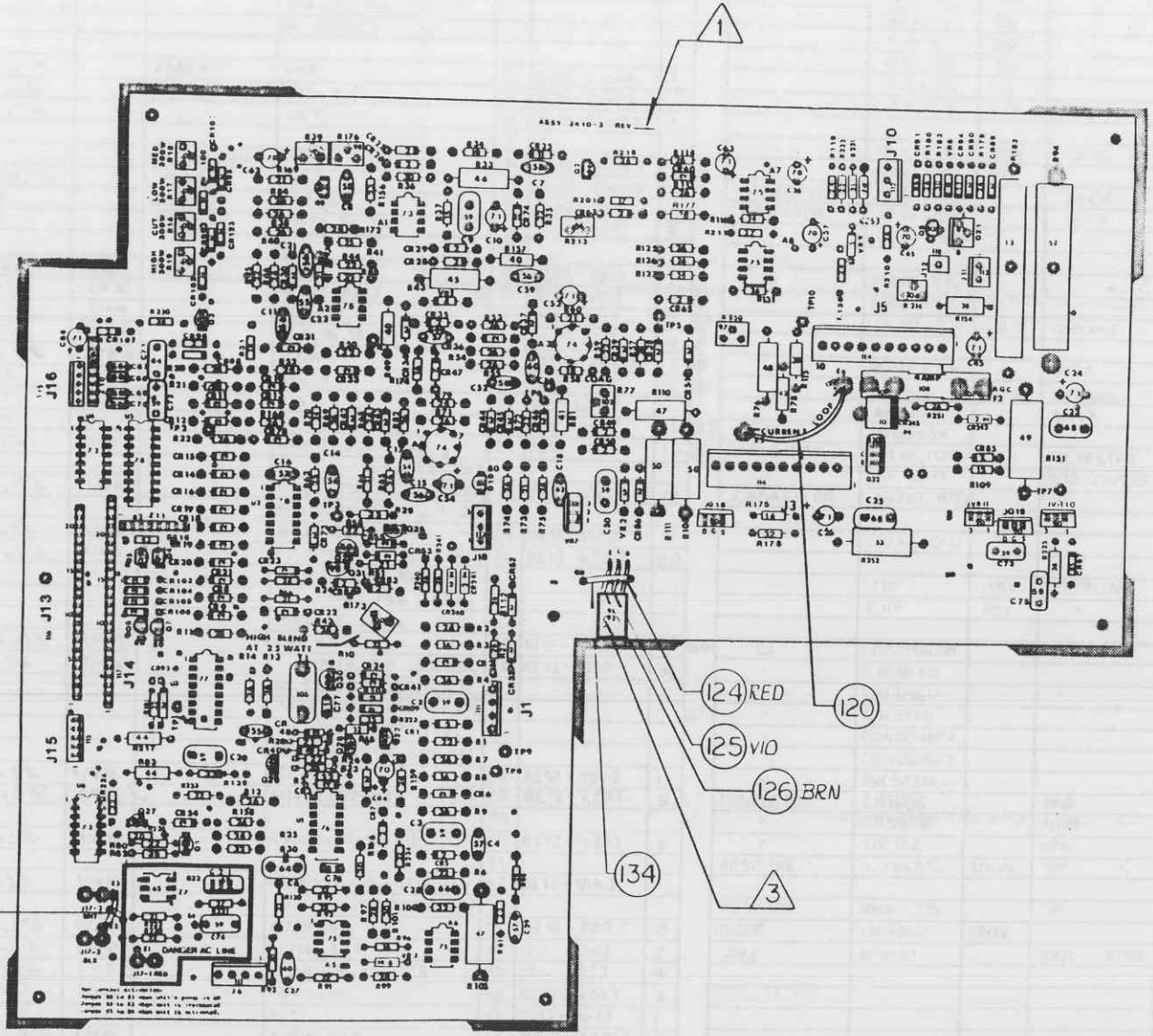
DISPLAY P.C.B. PARTS LIST
MODEL NO. 774

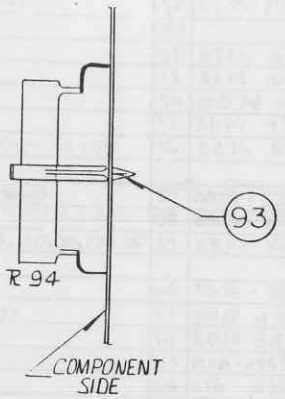
the BIRTCHER CORPORATION
El Monte — CALIFORNIA
CODE IDENT NO.

DWG NO. 3410-2 REV D


CUT
COAG
BIPOLAR
UNITS
TENS
100'S
Z 300 ICL 7107
Z 303 ICL 7107
Z 305 ICL 7107
Z 301 4009
Z 302 4009
Z 304 4009
DP 302
DP 301
DP 300
DP 305
DP 304
DP 303
DP 307
DP 306
+5V
R 300 100K
C 300 100 PF
C 304 .1
R 303 ADJUSTS FOR READ OUT FOR CUT 10 K
R 302 470E
R 301 1M ±1%
R 310 1K
VR 300 IN753
C 319 .1
C 301 .01
TP 301 -3.3V (REF)
C 322 .001
R 312 49.9K 1%
R 311 499K 1%
C 305 10
CR 300
C 307 .047
CR 301
C 306 .1
R 318 100K
C 325 100 PF
C 312 .1
R 305 ADJUSTS FOR READ OUT FOR COAG 10K
R 304 47 K
R 317 1M ±1%
R 306 1K
VR 301 IN753
C 321 .1
C 326 .01
TP 304 -3.3V (REF)
C 323 .001
R 314 49.9K 1%
R 313 499K 1%
C 316 10
CR 302
C 308 .047
CR 303
C 309 .1
R 320 100K
C 329 100 PF
C 330 .1
R 307 ADJUSTS FOR READ OUT FOR BIPOLAR 10K
R 309 47K
R 308 1K
VR 302 IN753
C 327 .1
C 328 .01
R 319 1M ±1%
TP 305 -3.3 (REF)
C 324 .001
R 316 49.9K 1%
R 315 499K 1%
C 315 10
CR 304
C 313 .047
CR 305
C 314 .1
TP 302
TP 303
C 320 10
DS 305 DS 304 DS 303 DS 301
3241 (10 PLCS)
DS 302 DS 306 DS 300 DS 307
TP 300 + 24V
R 321 22
J 300 TO J 14 ON MOTHER BOARD
1 +5V POWER GROUND
2 CUT INPUT LEVEL
3 CUT INPUT RETURN
4 COAG INPUT LEVEL
5 COAG SIGNAL RETURN
6 BIPOLAR INPUT LEVEL
7 BIPOLAR SIGNAL GROUND
8 HIGH BLEND
9 MEDIUM BLEND
10 LOW BLEND
11 PURE CUT
12 LAMP COMMON
13 CUT ON
14 COAG ON
15 POWER ON
16 BIPOLAR ON
17 +24V
18 KEY NOT USED
19 BIPOLAR
20
21
22
23
24
2 ALL RESISTORS ARE 1/4 W, 5%.
1 ALL CAPACITORS ARE IN μF.
NOTES UNLESS OTHERWISE SPECIFIED
LIST OF MATERIAL
SCHEMATIC
DISPLAY BOARD
MODEL 774
the BIRTCHER CORPORATION
D
3410-2S
C

REVISIONS					
REV.	DESCRIPTION	DATE	DRAWN	CHKD.	APPD
D	4543-18 REDRAWN "C" SIZE	11-7-86			
E	4543-25 DELETED R167, R168 & CR2	6-10-87			





COMPONENT SIDE

(2) 5. USE STATIC CONTROL BAG, ITEM 86, FOR STORING THE PC ASSY PRIOR TO TRANSFERING THE ASSY TO STOCK

(1) 4 IF THE PC BOARD ASSY GETS REWORKED OR OTHERWISE MODIFIED, STAMP THE NEW REV. LEVEL NEXT TO THE EXISTING ONE(S).

3 CONNECT WIRES (ITEMS 124, 125 & 126) TO JQ24 (ITEM 91) BEFORE MOUNTING JQ24 TO THE P.C. BOARD USING SUPERBOND 495 (ITEM 95). THEN SOLDER THE OTHER END OF THE WIRES TO THE PC. BOARD.

2 ADD JUMPER WIRE FROM E3 TO E2 TO OPERATE FAN WHEN THE UNIT OVERHEATS.

1 STAMP ASSEMBLY REVISION ON P.C. BOARD

NOTES: UNLESS OTHERWISE SPECIFIED

ITEM	REQD	PART NO.	DESCRIPTION	MATL SPEC.

LIST OF MATERIAL

DRAWN		DATE
CHKD.		
APPD.		
SCALE	FULL	
TOLERANCE EXCEPT AS NOTED		
ANGLES	±	
FRACTIONS	±	
DECIMALS	.XX ±	
	.XXX ±	
MATL	SEE SHEETS 2+3 OF 3 C SIZE FOR PARTS LIST	
FINISH		

MOTHER P.C. BOARD ASSEMBLY

MODEL Nº 774

the BIRTCHER CORPORATION

El Monte — CALIFORNIA

CODE IDENT NO.

DWG NO. C 3410-3 REV. E

SHEET 1 OF 3

NEXT ASSY USED ON 774-A

PARTS LIST

NAME	VALUE	RATING	TYPE	REF. DESIGNATOR	ITEM	PART NO.	QTY
[illegible]			[illegible]	[illegible]	93	[illegible]	4
SOCKET STR.			CRIMP	[illegible]		BN01 0052	1
TERMINAL			CRIMP TYPE		3.	DE03 0071	3
MTG. CLIP			PLASTIC		9.	DL05 - 0035	
WIRE			24 AWG L.H.T.		9.	HD02 [illegible]	.50"
SUPER BOND			495		9.	[illegible] 0048	A/R
					9.		
POTENTIOMETER	500 Ω	1/4 W	12 TURN	R250	97	BI22 - 0501	1
POTENTIOMETER	10K	1/4 W	12 TURN	R [illegible]	98	BI22 - 0103	1
					99		
POTENTIOMETER	200Ω, 10%	1W	TRIMMER, 12T	R173	100	BI22 - 0201	1
POTENTIOMETER	1K	1/4 W	TRIMMER, 1T	R39	101	BI16 - 102	1 (B)
"	10K	1/4 W	" , 1T	R77	102	BI16 - 103	1
"	5K	1/4 W	" , 1T	R16 - 19	103	BI16 - 0502	4
"	10K	1/4 W	" , 25T	R213, 214	104	BI18 - 0103	2
CRYSTAL	1 MHZ			Y1	105	BH01 - 0086	1
					106		
FUSE CLIP				FOR F2	107	BS07 0009	2
FUSE	4A - 32V		3AG.	F2	108	BS01 - 0025	1
					109		
CONNECTOR			SINGLE	J17-1, -2, -3	110	DE01 - 0034	3
CONNECTOR			4 PINS - .156 CTR	J16	111	BU05 - 0016	1
"			3 PINS - .156 CTR	J10, 17, 18	112	BU05 - 0011	3
"			2 PINS - .156 CTR	J11	113	BU05 - 0045	1
"			6 PINS - .156 CTR	J3, 5	114	BU06 - 0048	2
"			5 PINS - .100 CTR	J15, 16	115	BU05 - 0066	2
"			22 PINS - .100 CTR	J13	116	BU05 - 0079	1
"			24 PINS - .100 CTR	J14	117	BU05 - 0078	1
FAST ON				J12	118	DE01 - 0037	1
WIRE			24 AWG BLACK	MAKE 3 @ 3" LG EA.	119	HD02 - 0020 - 0	9"
WIRE			16AWG - WHITE		120	HD02 - 0001 - 9	4"
WIRE			24 AWG RED	MAKE 3 @ 1" LG EA.	121	HD02 - 0020 - 2	3"
WIRE			22 AWG RED		124	HD02 0026-2	.5' (B)
"			" VIO		125	HD02 -0026- [illegible]	.5' (B)
"			" ORN		126	HD02 - 0026-1	.5' (B)
					128		
					129		
TRANSISTOR	2N6043			Q32	130	BL06-0078	1 (B)
					131		
	1N4148			[illegible]	132	BL08 - 1N4148	
					133		
TIE WRAP					134	GF01 - 0002	2

NAME	VALUE	RATING	TYPE	REF. DESIGNATOR	ITEM	PART NO.	QTY

REVISIONS

REV.	DESCRIPTION	DEPT	DATE	DRAWN	CHKD	APPD
	[illegible]					

NOTES: UNLESS OTHERWISE SPECIFIED

ITEM	REQD	PART NO	DESCRIPTION	MATL SPEC

LIST OF MATERIAL

DRAWN	DATE	ASS'Y MOTHER BOARD PART LIST MODEL 774
CHKD.		
APPD.		
SCALE		
TOLERANCE EXCEPT AS NOTED: ANGLES ±, FRACTIONS ±, DECIMALS .XX ±, .XXX ±		MATL
		FINISH

the BIRTCHER CORPORATION
El Monte — CALIFORNIA
CODE IDENT NO.

DWG. NO. 3410-3 REV E

SHEET 3 OF 3 DIST.

USED ON 774
NEXT ASSY

PARTS LIST

NAME	VALUE	RATING	TYPE	REF. DESIGNATOR	ITEM	PART NO.	QTY
PC B					1	D-20232-3	1
IN914			DIODE	CR1-24, 26-55, 60,	2	BL02-914B	84
				63, 65, 73, 78, 83-86,			
				89, 90, 93, [illegible]			
				98-109, 121, [illegible] -243			
					3		
1N5236B	7.5V, 5%		ZENER	VR1	4	BL03-5236B	1
IN5240B	10V, 5%		"	VR2, 9	5	BL03-5240B	2
IN5245B	15V, 5%		"	VR3	6	BL03-5245B	1
					7		
7905			VOLTAGE REG	VR7	8	BL16-7905CT	1
IN4744A	15V, 1W, 5%		ZENER	VR8	9	BL03-4744A	1
MR752	200V		DIODE	CR245	10	BL02-752	1
IN4937	600V		DIODE	CR25, 74, 94	11	BL02-4937	3
					12		
RESISTOR	8K, 1%	1/8W	W.W.	R182	13	BL05-0013	1
"	47, 5%	1/4W		R175, R253	14	BI12-470J	2 (B)
"	100, 5%	1/4W		R37, 109	15	BI12-101J	2 (B)
"	220, 5%	1/4W		R3, 8, 96, 174	16	BI12-221J	4 (B)
"	750, 5%	1/4W		R201	17	BI12-751J	1 (B)
"	470, 5%	1/4W		R31, 58	18	BI12-471J	2 (B)
"	680, 5%	1/4W		R34	19	BI12-681J	1
"	1.5K, 5%	"		R224	20	BI12-152J	1 (B) (E)
"	1K, 5%	1/4W		R28, 47, 51, [illegible] 4, [illegible], 73,	21	BI12-102J	10 (B)
				163, 222, 231			
"	2.2K, 5%	1/4W		R1, 6, 26, 35, 44, 45, 56,	12	BI12-222J	13
				59, 72, 80, [illegible] 220, [illegible] 233			
"	3.3K, 5%	1/4W		R61, 156	23	BI12-332J	2
"	4.7K, 5%	1/4W		R2, 7, 20, 21, 24, 25, 42,	24	BI12-472J	20
				46, 52, 57, 68, 70, 75, 79,			
				119, 136, 158,			
				159, 172, 230,			
"	6.8K, 5%	1/4W		R63, 41	25	BI12-682J	2 (B) (A)
"	10K, 5%	1/4W		R12, 13, 22, 27, 38,	26	BI12-103J	30
				40, 53-55, 65, 69, 71,			
				74, 82, 84, [illegible] 91, 112-114, 125,			(B)
				126, 131, 160, 177, 179,			
				180, 210, 218, 240, 241			
"	150, 5%	1/4W		R221	27	BI12-151J	1
"	22K, 5%	1/4W		R41, 97, 97-98	28	BI12-223J	5
					29		
"	47K, 5%	1/4W		R36, 93, 101, 166, 183	30	BI12-473J	5
					31		
"	100K, 5%	1/4W		R5, 10, 18, 50, [illegible], 91,	32	BI12-104J	13
				95, 106, 178, 181, 226, 234			
"	22Ω, 5%	1/4W		R120, 139	33	BI12-220J	2
"	270K, 5%	1/4W		R116, 127	34	BI12-274J	2
"	1.5K, 5%	1/4W		R23, 29, 66, 223	35	BI12-152J	4
"	470K, 5%	1/4W		R44, [illegible]	36	BI12-474J	3
"	56K, 5%	1/4W		R211	37	BI12-563J	1
"	33K, 5%	1/2W		R154, 225	38	BI13-333J	2
"	100, 5%	1/2W		R115	39	BI13-101J	1
"	47K, 5%	1/2W		R49, 197	40	BI13-473J	2
"	1K, 5%	1/2W		R81	41	BI13-102J	1
"	4.7K, 5%	1/2W		R28	42	BI13-472J	1
"	150, 5%	1/2W		R216	43	BI13-151J	1
"	220, 5%	1/2W		R [illegible] 217	44	BI13-221J	2

NOTES: UNLESS OTHERWISE SPECIFIED

NAME	VALUE	RATING	TYPE	REF. DESIGNATOR	ITEM	PART NO.	QTY
RESISTOR	10K, 5%	1W		R43	45	BI14-103J	1
"	33K, 5%	1W		R33	46	BI14-333J	1
"	1K, 5%	2W		R102, 110	47	BI15-102J	2
"	47K, 5%	1W		R76	48	BI14-473J	1
"	10Ω, 5%	2W		R151	49	BI05-0076	1
"	2.2K, 5%	2W		R108, 111	50	BI15-222J	2
"					51		
"	3K, 5%	20W	W.W.	R94	52	BI05-0075	1
"	10Ω, 5%	2W		R252	53	BI15-100J	1 (B)
CAPACITOR	10PF 5%		MICA	C17	54	BB14-100J	1
CAPACITOR	47PF, 5%		MICA	C5, 22	55	BB14-470J	2
"	100PF, 5%		"	C11, 14, 15, 21, 52, 59	56	BB14-101J	10
				67-70			
"	220PF, 5%			C4, 12, 16, 29	57	BB14-221J	4
"	470PF, 5%			C7, 8	58	BB14-471J	2
"	.1 UF, 5%	63V	CERAMIC	C2, 3, 9, 20, 50, 72-75	59	BB19-104K	9
"	1000PF, 5%		MICA	C13, 27	60	BB14-102J	2
"	.0047UF	63V	CERAMIC	C76, C77	61	BB19-472K	2
"	680 PF		MICA	C18	62	BB14-681J	1
SCR	2N6343A			Q22	63	BL06-6343A	1
CAPACITOR	.01 UF, 10%		POLYESTER	C6, 71	64	BB16-1039	2
IC	MOC 3011		OPTO COUPLER	Z7	65	BL14-3011	1
CAPACITOR	.0047UF, 10%			C28	66	BB16-4739	1
					67		
"	.22 UF, 10%			C23, 25	68	BB16-2249	2
					69		
"	1 UF,	35V	TENTALUM	C1, 36, 65 37	70	BB15-105X9	4
"	10 UF	35V	"	C10, 24, 26, 45, 53, 54,	71	BB15-106X9	9
				62, 63, 66			
IC	CD4016BM			U4, 6	72	BL15-4016BM	2
"	LM307N			A1	73	BL10-307N	1
"	LM306H			A3, 4	74	BL10-306H	2
"	LM311N			A2, 5-8	75	BL10-311N	5
"	CD4001BFX			U1, 2	76	BL15-4001BFX	2
"	CD4060BFX			U3	77	BL15-4060BFX	1
"	74C922N			U5	78	BL17-74C922N	1
TRANSISTOR	2N3906		PNP	Q1, 28, 31	79	BL06-3906	3 (B)
"	2N5904		NPN	Q2-Q10, 23, 25-27, 29, 30	80	BL06-3904	15
"	TIP 102		NPN	Q21	81	BL06-TIP102	1
RESISTOR	4.7K, 5%	1/4W	SIP	Z11	82	BI21-0100	1
RESISTOR	100K, 5%		SIP	Z10	84	BI20-105	1
DIODE	1N4002	200V		CR91, 97	85	BL02-4002	2
PAG	11" x 15"		STATIC NEUTRAL		86	CR05-0015	1 (D)
[illegible]					88	D-32[illegible]-3S	REF
					89		

REVISIONS

REV.	DESCRIPTION	DEPT	DATE	DRAWN	CHKD.	APPD
	SEE SHEET 1 OF 3					

ITEM	REQ'D	PART NO.	DESCRIPTION	MATL SPEC

LIST OF MATERIAL

DRAWN	DATE	
CHKD.		
APPD.		
SCALE		

TOLERANCE EXCEPT AS NOTED
ANGLES ±
FRACTIONS ±
DECIMALS .XX ±
.XXX ±

USED ON 774
NEXT ASSY

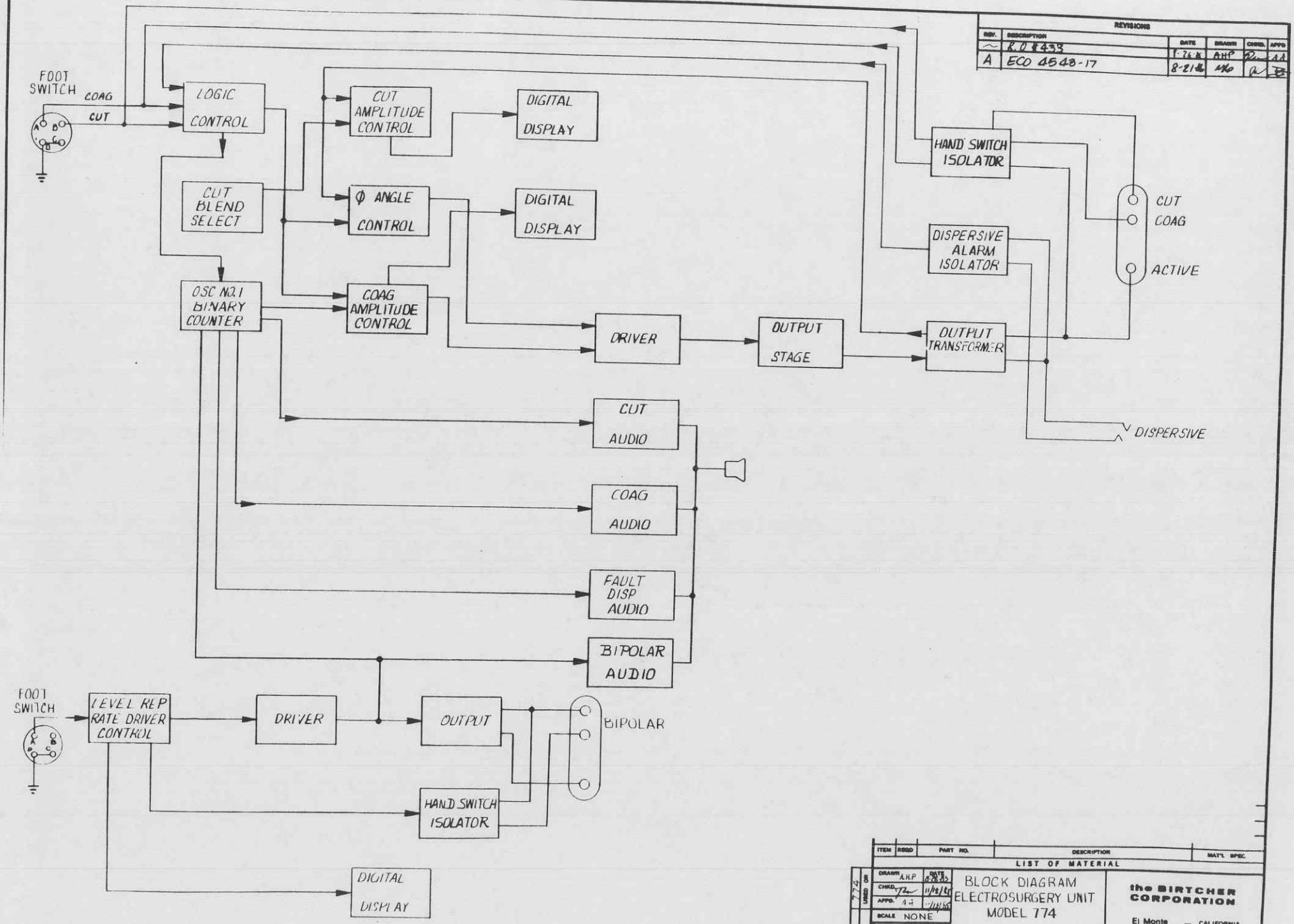
ASSY MOTHER BOARD PART LIST MODEL 774

MATL
FINISH

the BIRTCHER CORPORATION
El Monte — CALIFORNIA
CODE IDENT NO

DWG NO. 3410-3 REV

SHEET OF 3 DIST



REVISIONS					
REV.	DESCRIPTION	DATE	DRAWN	CHKD.	APPD
~	R.D. #433	1-26-82	AHP		
A	ECO 4543-17	8-21-86	AHP		

NOTES: UNLESS OTHERWISE SPECIFIED

ITEM	REQD	PART NO.	DESCRIPTION	MAT'L SPEC.

LIST OF MATERIAL

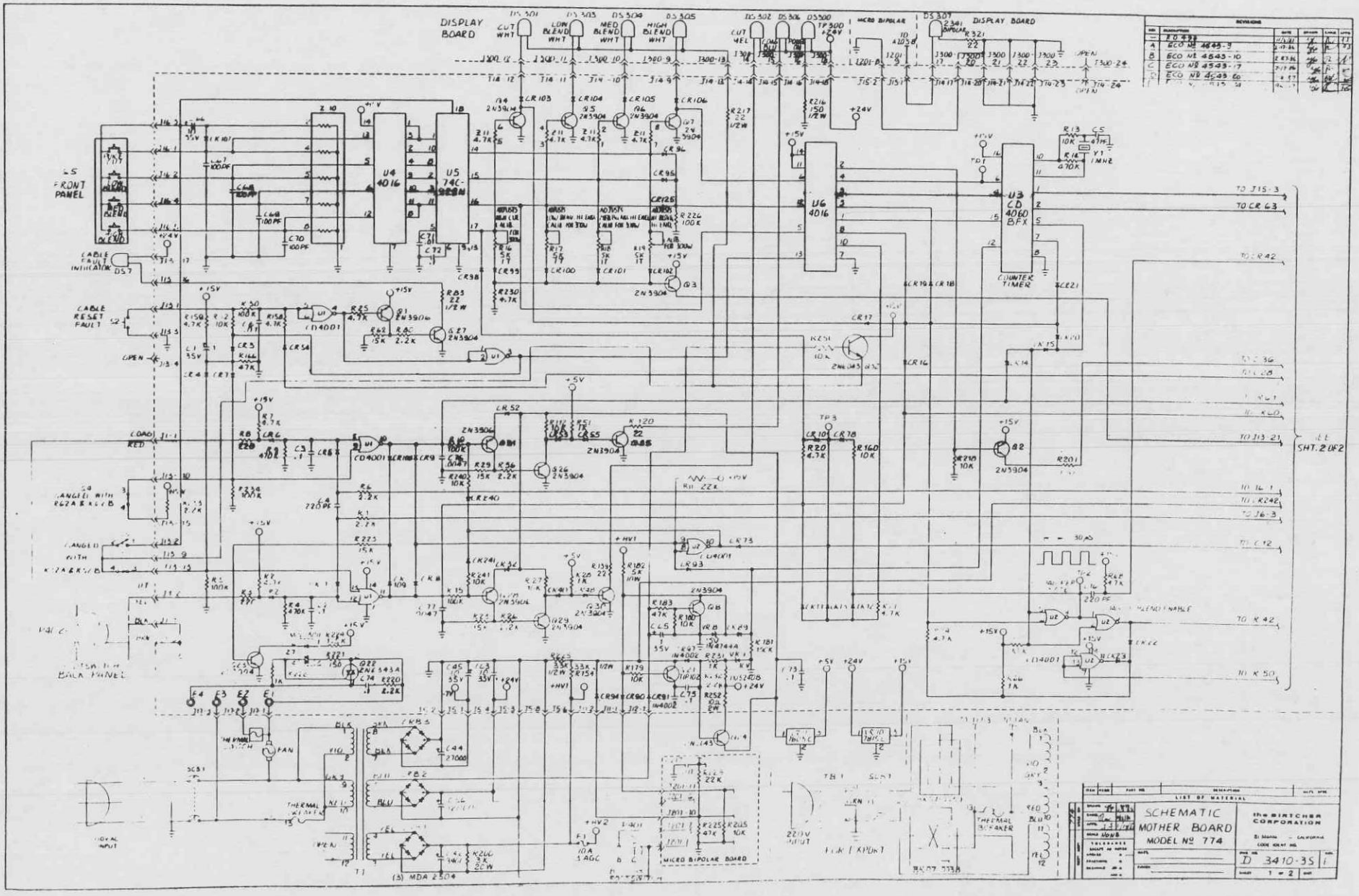
DRAWN	A.H.P	DATE 8-20-82	BLOCK DIAGRAM ELECTROSURGERY UNIT MODEL 774
CHKD.		11/8/82	
APPD.		11/8/82	
SCALE	NONE		
TOLERANCE	EXCEPT AS NOTED		
ANGLES	±		
FRACTIONS	±		
DECIMALS	.XX ±		
MAT'L			
FINISH			

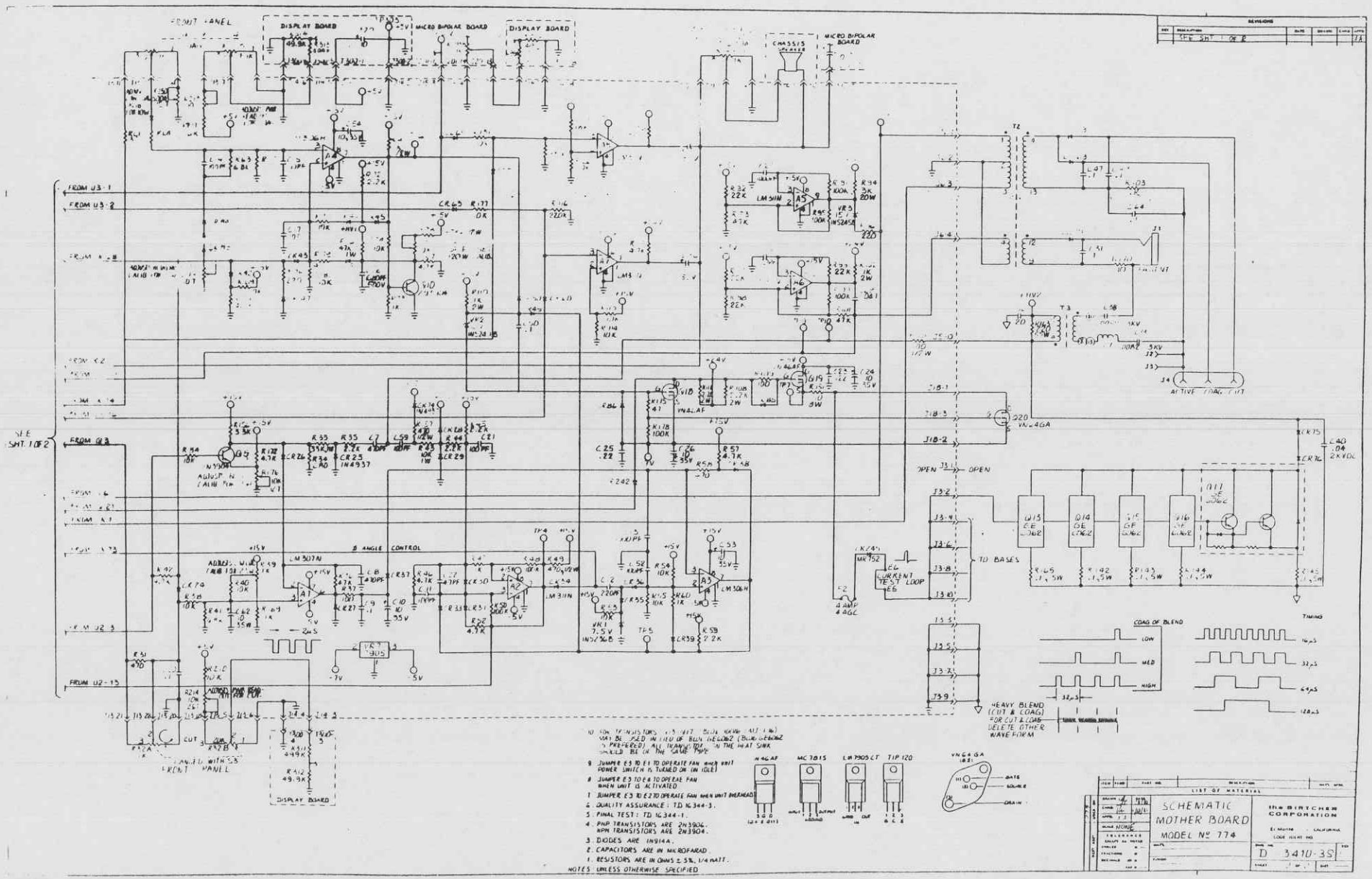
774 USED ON — NEXT ASSY

the BIRTCHER CORPORATION
El Monte — CALIFORNIA
CODE IDENT NO.

DWG NO. C 774 BD REV. A

SHEET 1 OF 1 SHT.


DISPLAY BOARD
DS301
DS303
DS304
DS305
DS302
DS306
DS308
DS307
CUT WHT
LOW BLEND WHT
MED BLEND WHT
HIGH BLEND WHT
CUT YEL
MICRO BIPOLAR
DISPLAY BOARD
FRONT PANEL
CABLE FAULT INDICATOR
CABLE RESET FAULT
U4 4016
U5 74C-922N
U6 4016
U3 CD 4060 BFX
COUNTER TIMER
CD4001
2N3904
2N3906
TIP102
TIP107
IN4744A
IN4002
IN5242B
MICRO BIPOLAR BOARD
BACK PANEL
FAN
THERMAL BREAKER
220V INPUT
LINE EXPORT
(3) MDA 2504
SCHEMATIC
MOTHER BOARD
MODEL Nº 774
the BIRTCHER CORPORATION
D 3410-35 1
SHT. 2 OF 2


SCHEMATIC
MOTHER BOARD
MODEL Nº 774
The BIRTCHER CORPORATION
D 3410-35
LIST OF MATERIAL
REVISIONS
FRONT PANEL
DISPLAY BOARD
MICRO BIPOLAR BOARD
CHASSIS
TO BASES
HEAVY BLEND (CUT & COAG) FOR CUT & COAG DELETE OTHER WAVE FORM
COAG OF BLEND
LOW
MED
HIGH
TIMING
NOTES UNLESS OTHERWISE SPECIFIED
1. ALL TRANSISTORS ARE 2N3417 PLUS (KNEE OUT LINE) UNLESS NOTED IN RED OR BLUE (RED DENOTES PREFERED) ALL TRANSISTORS IN THE HEAT SINK SHOULD BE IN THE SAME TYPE
2. JUMPER E3 TO E1 TO OPERATE FAN WHEN UNIT POWER SWITCH IS TURNED ON (IDLE)
3. JUMPER E3 TO E4 TO OPERATE FAN WHEN UNIT IS ACTIVATED
4. JUMPER E3 TO E2 TO OPERATE FAN WHEN UNIT OVERHEADS
5. QUALITY ASSURANCE: TD 1344-3.
6. FINAL TEST: TD 1344-1.
7. PNP TRANSISTORS ARE 2N3906. NPN TRANSISTORS ARE 2N3904.
8. DIODES ARE 1N914A.
9. CAPACITORS ARE IN MICROFARAD.
10. RESISTORS ARE IN OHMS ± 5% 1/4 WATT.

REVISIONS

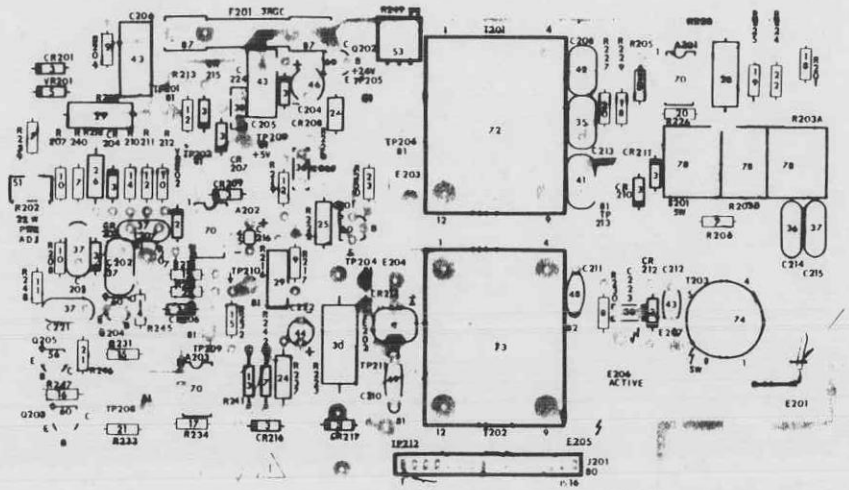


TABLE 1 REV LEVEL

ASSY REV	TED REV	A/W REV
3	3	4

ITEM	REQD	PART NO	DESCRIPTION	MATL SPEC

LIST OF MATERIAL

DRAWN	DATE	the BIRTCHER CORPORATION
CHKD		
APPD		
SCALE X		
TOLERANCE EXCEPT AS NOTED		
ANGLES -		
FRACTIONS -		
DECIMALS XX - -		
XXX		
MATL		
FINISH		
		D

NOTES: UNLESS OTHERWISE SPECIFIED

PARTS LIST

NAME	VALUE	RATING	TYPE	REF. DESIGNATOR	ITEM	PART NO.	QTY
MICRO BIPOLAR P.C.B.					1	D[illegible]4	1
DIODE	1N5240B	10V	ZENER	VR202	2	BL03-5240B	1
"	1N914B	75V		CR201, 202, 203, 204, 205, 206, 207	3	BL02-914B	13
"	MR826			CR214	4	BL02-826	1
"	1N5231B	5.1V	ZENER	VR201	5	BL03-5231B	1
					6		
RESISTOR	47Ω	1/4W, 5%	CARBON COMP FB MIL-R11RC11	R206, 239, 240, 242	7	BI12-470J	4
"	100Ω	"	"	R250	8	BI12-101J	1
"	220Ω	"	"	R204, 217	9	BI12-221J	2
"	470Ω	"	"	R207, 209, 212	10	BI12-471J	3
"	1.5K	"	"	R248	11	BI12-152J	1
"	2.2K	"	"	R211, 213, 219	12	BI12-222J	3
"	3.3Ω	"	"	R241	13	BI12-330J	1
"	4.7K	"	"	R210, 245	14	BI12-472J	2
"	10K	"	"	R205, 214, 231, 232	15	BI12-103J	4
"	15K	"	"	R247	16	BI12-153J	1
"	1K	"	"	R234	17	BI12-102J	1
"	22K	"	"	R201, 229	18	BI12-223J	2
"	47K	"	"	R225	19	BI12-473J	1
"	100K	"	"	R226, 227	20	BI12-104J	2
"	220K	"	"	R215, 233, 246	21	BI12-224J	3
"	470K	"	"	R224	22	BI12-474J	1
"	20K	"		R250	23	BI12-203J	1
"	100Ω	1/2W, 5%	CARBON COMP FB MIL-R11RC20	R220 R221	24	BI13-101J	2 B
"	1K	"	"	R222	25	BI13-102J	1
"	2.2K	"	"	R218	26	BI13-222J	1
					27		
"	470Ω	1W, 5%	CARBON COMP GB RC32	R223	28	BI14-471J	1 A
"	1.5K	"	"	R209, 216	29	BI14-152J	2 A
"	.1Ω	5W, 1%	WIREWOUND	R223	30	BL05-0091	1
					31		
					32		
					33		
					34		
CAPACITOR	100 PF	500V	DIPPED MICA	C213	35	BB14-101J	1
"	470 PF	"	"	C209, 214	36	BB14-471J	2
"	1000 PF	100V	"	C202, 203, 207, 215, 221	37	BB19-102J	5
"	.47μF	100V	MYLAR	C223, 224	38	BB19-474K	2
					39		
					40		
"	.01μF	100V	POLYESTER FOIL	C217	41	BB16-1039	1
"	.047μF	"	"	C208	42	BB16-4739	1
"	.1μF	"	"	C205, 206, 212	43	BB16-1049	3
"	10μF	35V	TANTALUM	C222	44	BB15-106X9	1
"	1μF	"	"	C216	45	BB15-105X9	1
"	47μF	50V	ELECTROLYTIC	C204	46	BB08-476X9	1
					47		
"	.0082μF	3000V	CERAMIC	C211	48	BB06-0107	1 B
"	.0068μF	500V	DIPPED MICA	C210	49	BB17-682J	1
					50		
RESISTOR	1K		POT	R202	51	BI16-102	1
					52		
"	10K	20T	POT	R249	53	BI06-0160	1
					54		
					55		
TRANSISTOR	2N2907A		PNP	Q205	56	BL06-2907A	1
					57		
					58		

NAME	VALUE	RATING	TYPE	REF. DESIGNATOR	ITEM	PART NO.	QTY
					59		
TRANSISTOR	2N2222A		NPN	Q201, 202, 203, 204	60	BL06-2222A	4
					61		
					62		
					63		
					64		
					65		
					66		
					67		
					68		
					69		
I.C.	LM311N			A201, 202, 203	70	BL10-311N	3
					71		
TRANSFORMER			OUTPUT	T201	72	B3410-13	1
"			OUTPUT	T202	73	B3238	1
"			ISOLATION	T203	74	B3239	1
					75		
					76		
					77		
2 POTS + SWITCH	1K + 20K + SW.			R203A + R203B + SW	78	BL08-0016	1
					79		
CONNECTOR			16 PIN	P201	80	BL05-0062	1
CONNECTOR JACK				TP201-213	81	BL06-0040	13
					82		
					83		
					84		
WIRE	18 AWG		RED, INSULATED		85	HD02-0019	2.5"
TIE WRAP					86	[illegible]	1
FUSE CLIP			P.C. MTG. EAR		87	BS02-0009	2
FUSE	3 AMP		3AGC	F201	88	BS01-0032	1
					89		
					90		
TECH. DATA					91	TD16349-2	REF
SCHEMATIC					92	C3410-45	REF B
					93		
					94		
					95		
					96		
					97		
					98		
					99		
					100		

NOTES: UNLESS OTHERWISE SPECIFIED

REVISIONS					
REV	DESCRIPTION	DEPT	DATE	DRAWN	CHKD

ITEM	REQD	PART NO.	DESCRIPTION	MAT'L SPEC
LIST OF MATERIAL				

7744
7744
USED ON
3410-5
NEXT ASSY

DRAWN ARH 08/5/84
CHKD
APPD.
SCALE —
TOLERANCE EXCEPT AS NOTED
ANGLES ±
FRACTIONS ±
DECIMALS .XX ±
.XXX ±

MICRO BIPOLAR
P.C. BOARD ASSY

MAT'L ~
FINISH ~

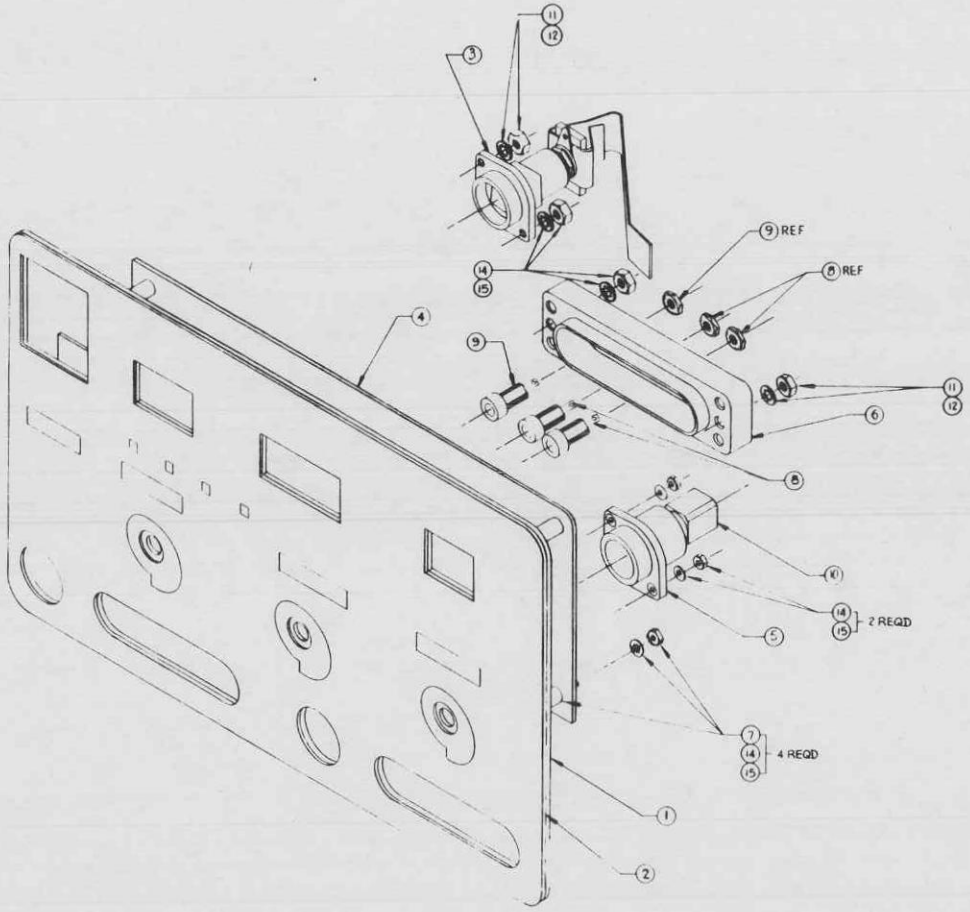
the BIRTCHER CORPORATION
El Monte — CALIFORNIA
CODE IDENT NO.

DWG NO. C3410-9 REV E5
SHEET 2 OF 2 DIST.

14060-32

SHEET 1 OF 2 (8½" x 11" SIZE)

REVISIONS					
REV.	E.C.O. NO.	DATE	DRAWN	CHK'D.	APP'D.
—	M 6483	1/31/67			
A	ECO 4543-17	7-10-80			



ITEM	REQD	PART NO.	DESCRIPTION	MATL SPEC.
15	8	DH02-0020	NUT, HEX, 4-40	
14	8	DL04-0001	WASHER, I.T. LOCK, NO.4	
13				
12	2	DH02-0032	NUT, HEX 2-56	
11	2	DL04-0025	WASHER, I.T. LOCK, NO. 2	
10	1	BM03-0023	JACK, 2 CONDUCTOR	
9	1	BM03-0025	BANANA JACK, ORANGE, WITH HARDWARE	
8	2	BM03-0021	BANANA JACK, BLACK, WITH HARDWARE	
7	4	SB03-0029	INSULATING BUSHING	
6	1	B24113	RECEPTACLE, SWITCH	
5	1	C24110	RECEPTACLE, DISPERSIVE	
4	1	3410-2	DISPLAY BOARD ASSY	
3	1	3410-25	FOOTSWITCH CONNECTOR ASSY	
2	1	D20232-1	FRONT PANEL OVERLAY	
1	1	C20232-7	FRONT PANEL	

LIST OF MATERIAL

NOTES: UNLESS OTHERWISE SPECIFIED

DRAWN		DATE 1-21-82
CHK'D		1/26/82
APP'D	A.A	2/4/82
SCALE NONE		
TOLERANCE EXCEPT AS NOTED		
ANGLES	± —	
FRACTIONS	± —	
DECIMALS .XX	± —	
.XXX	± —	

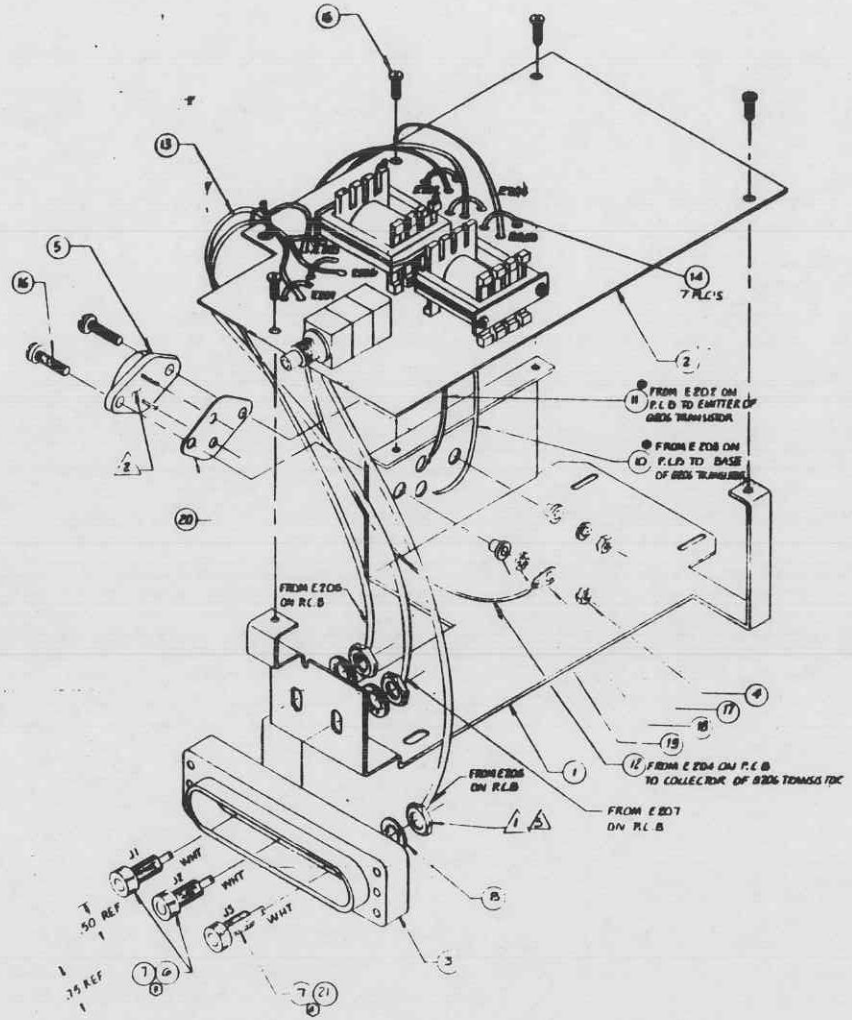
D3410-3A4 7744
D3410-3A6 774
NEXT ASSY USED ON

ASSEMBLY-
FRONT PANEL,
MODEL 774

The BRITTONER CORPORATION
El Monte — CALIFORNIA
CODE IDENT NO.

MATL
FINISH

SIZE D | DWG. NO. 3410-8 | REV A
SHEET 1 of 1


7 PLC'S
FROM E202 ON P.C.B TO EMITTER OF 2N3055 TRANSISTOR
FROM E208 ON P.C.B TO BASE OF 2N3055 TRANSISTOR
FROM E205 ON P.C.B
FROM E204 ON P.C.B TO COLLECTOR OF 2N3055 TRANSISTOR
FROM E206 ON P.C.B
FROM E207 ON P.C.B
J1 WHT
J2 WHT
J3 WHT
.50 REF
.75 REF

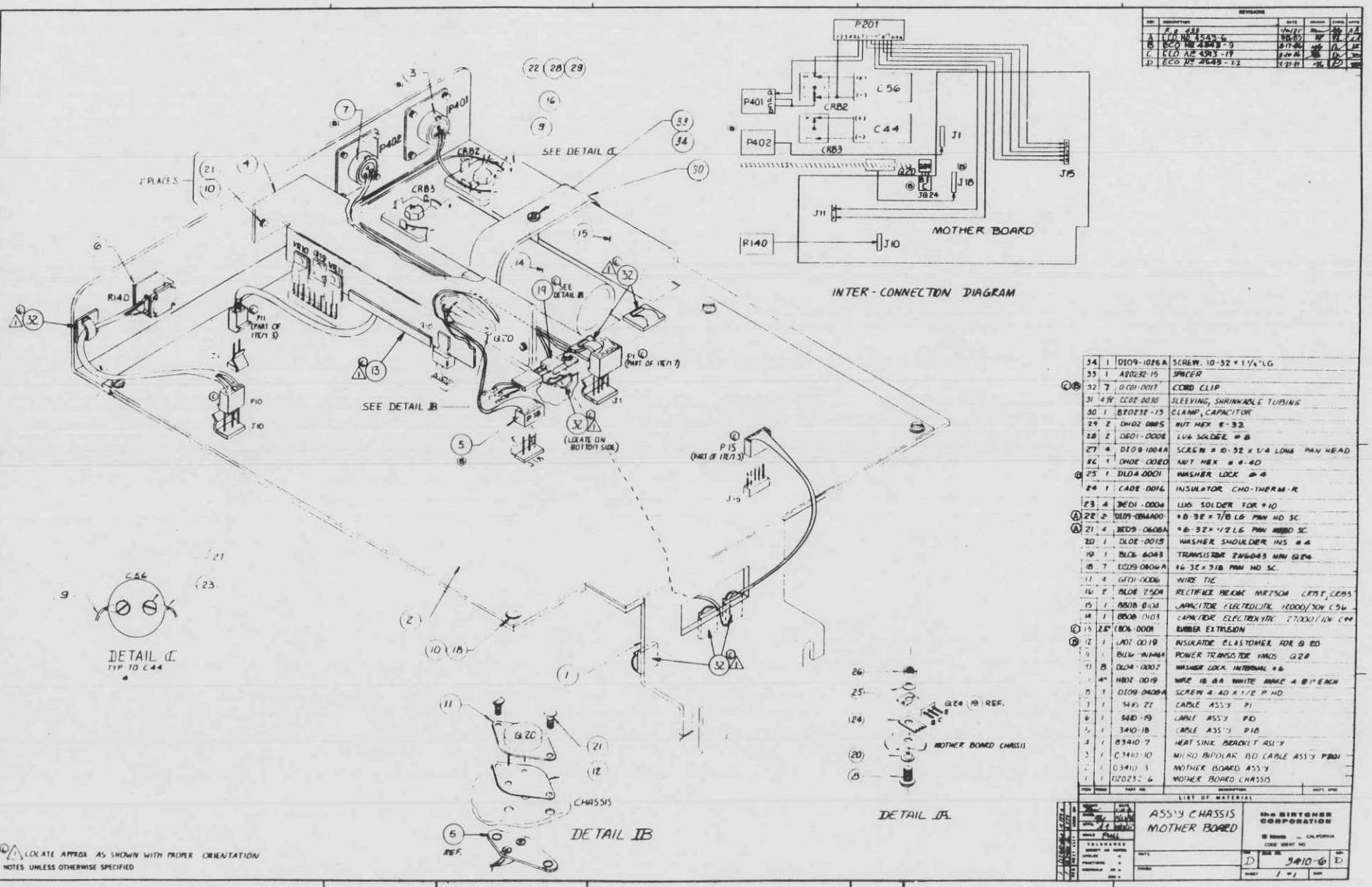
REVISIONS					
REV.	E.C.O. NO.	DATE	DRAWN	CHKD	APPD
~	E00459	10/23/84	TM	MP	AA
A	4548-H	2/10/86	MP	MK	AA
B	4548-17	9-10-86	MP	AV	[illegible]

ITEM	REQD	PART NO	DESCRIPTION	MATL SPEC
15	1	BM03-0025	JACK BANANA ORANGE	
20	1	CA08-0003	INSULATOR MICA TO-3	
18	2	DL08-0006	WASHER SHOULDER #6	
16	2	DL04-0002	WASHER LOCK #6	
17	1	DE01-0007	LUG SOLDER #6 I.T.	
14	2	DH08-00084	SCREW 6-32 x 1/2 LG PAN HD	
15	A	DE09-0404D	SCREW, SELF TAPING #4-40 x 1/4 LG	
14	7	BP01-0002	TIE WRAP	
13	24	HD02-0003-2	WIRE HIGH VOLAGE RED MARK 3 8" EA	
12	7"	HD02-0018-2	WIRE 18 GA RED	
11	7"	" " -6	" " BLUE	
10	7"	" " -1	" " BROWN	
9	N/R	JA03-0004	HEAT SINK COMPOUND	
8	3	DL04-0014	LOCK WASHER 3/8" IT	
7	A/R	CC02-0010	SHRINKABLE TUBING	
6	2	BM03-0019	JACK BANANA WHITE	
5	1	BLING-GE806R	TRANSISTOR 2N3055	
4	1	DM32-0004	NUT, HEX #6-32	
3	1	B2411A	RE-EPTALL	
2	1	C2410-A	WIRED BIPOLAR P.C.B	
1	1	C20232-5	MICRO BIPOLAR CHASSIS	

LIST OF MATERIAL

DRAWN		DATE 4/24/86	ASS'Y MICRO BIPOLAR CHASSIS MODEL 771
CHKD	AV		
APPD			
SCALE			
TOLERANCE EXCEPT AS NOTED: ANGLES ±°, DECIMALS .X ±, .XX ±, .XXX ±, FRACTIONS ±, BEND RES XX ±			
MATL			
SIZE D	DWG NO	REV	

the BIRTCHER CORPORATION
El Monte CALIFORNIA
CODE IDENT NO

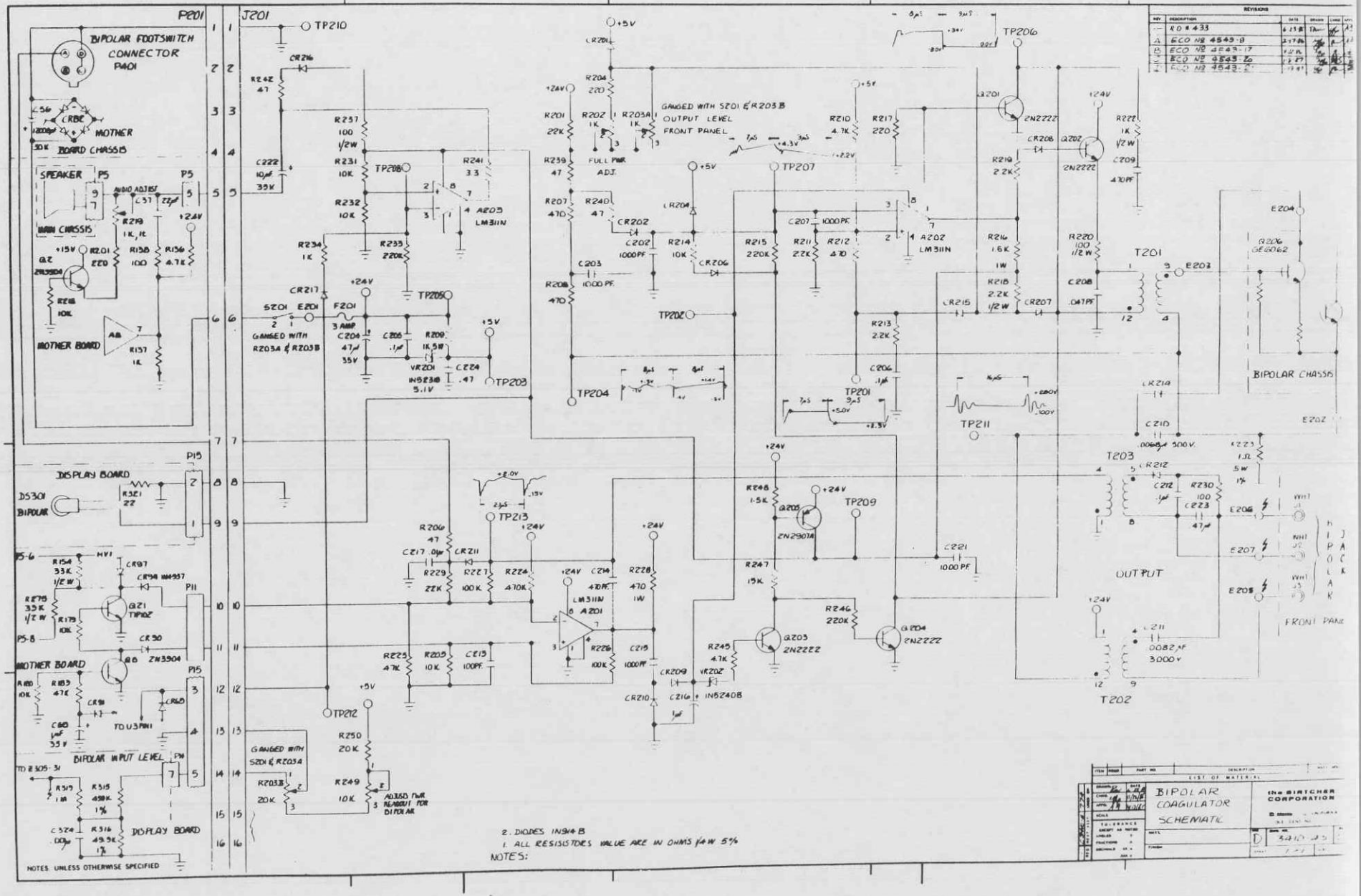


REVISIONS					
NO.	DESCRIPTION	DATE	DRAWN	CHKD	APPD
	P.O. 633	1/9/67	RM	BB	BB
A	ECO NO 4548-6	9/6/67	RM	BB	BB
B	ECO NO 4849-9	8/17/68	RM	BB	BB
C	ECO NO 4993-19	8/24/68	RM	BB	BB
D	ECO NO 5649-12	4/9/69	RM	BB	BB

	34	1	D109-1026A	SCREW, 10-32 × 1 1/4" LG
	33	1	A20232-15	SPACER
A B	32	7	D001-0017	CORD CLIP
	31	4"	CC02-0030	SLEEVING, SHRINKABLE TUBING
	30	1	B20232-13	CLAMP, CAPACITOR
	29	2	DH02-0005	NUT HEX #8-32
	28	2	D601-0002	LUG SOLDER #8
	27	4	D109-1004A	SCREW #10-32 × 1/4 LONG PAN HEAD
	26	1	DH06-0020	NUT HEX #6-40
B	25	1	DL04-0001	WASHER LOCK #4
	24	1	CA08-0016	INSULATOR CHO-THERM-R
	23	4	JE01-0004	LUG SOLDER FOR #10
A	22	2	D109-0844A00	#8-32 × 7/8 LG PAN HD SC.
A	21	4	JE09-0608A	#6-32 × 1/2 LG PAN [illegible] SC.
	20	1	DL02-0015	WASHER SHOULDER INS #4
	19	1	BL06-6043	TRANSISTOR 2N6043 MIN Q26
	18	7	D109-0804A	#6-32 × 5/8 PAN HD SC.
	17	4	GF01-0006	WIRE TIE
	16	2	BL02-2504	RECTIFIER BRIDGE MR2504 CR28, CR33
	15	1	BB08-0403	CAPACITOR ELECTROLYTIC 12000/30V C56
	14	1	BB08-0103	CAPACITOR ELECTROLYTIC 27000/10V C44
C	13	25"	CB06-0001	RUBBER EXTRUSION
B	12	1	JA01-0019	INSULATOR ELASTOMER FOR Q20
	11	1	BL06-MJ4645	POWER TRANSISTOR MJ4645 Q20
	10	8	DL04-0007	WASHER LOCK INTERNAL #6
	9	4"	HB02-0019	WIRE 18 GA WHITE MARK A 8" EACH
	8	1	D109-0408A	SCREW 4-40 X 1/2 P HD
	7	1	3410-22	CABLE ASSY P1
	6	1	3410-19	CABLE ASSY P10
	5	1	3410-18	CABLE ASSY P18
	4	1	B3410-7	HEAT SINK BRACKET ASSY
	3	1	C3410-10	MICRO BIPOLAR BD CABLE ASSY P201
	2	1	D3410-8	MOTHER BOARD ASSY
	1	1	D20232-6	MOTHER BOARD CHASSIS

LIST OF MATERIAL

DRAWN	12/66 RM	ASSY CHASSIS MOTHER BOARD	the BERGNER CORPORATION
CHECKED	12/66 BB		
ENGR APPD	12/66 BB		
SCALE FULL			
TOLERANCES			
MATL			
FINISH			
		SIZE D	DWG NO. 3410-6 REV D
		SHEET 1 OF 1	


P201
J201
BIPOLAR FOOTSWITCH CONNECTOR P401
MOTHER BOARD CHASSIS
SPEAKER
MAIN CHASSIS
MOTHER BOARD
DISPLAY BOARD
DS301 BIPOLAR
BIPOLAR INPUT LEVEL
TO U3 PIN1
TO J305-31
NOTES: UNLESS OTHERWISE SPECIFIED
TP210
TP208
TP205
TP202
TP204
TP203
TP212
TP213
TP201
TP211
TP206
TP207
TP209
+5V
+24V
+15V
3 AMP
GANGED WITH SZ01 & RZ03A & RZ03B
GANGED WITH SZ01 & RZ03A
FULL PWR ADJ.
OUTPUT LEVEL FRONT PANEL
AUDIO ADJUST
A2D3 LM311N
A2D2 LM311N
A2D1 LM311N
AD365 PWR READOUT FOR BIPOLAR
T201
T202
T203
BIPOLAR CHASSIS
OUTPUT
FRONT PANEL
BIPOLAR COAGULATOR SCHEMATIC
the BIRTCHER CORPORATION
LIST OF MATERIAL
REVISIONS
NOTES:
1. ALL RESISTORS VALUE ARE IN OHMS 1/4W 5%
2. DIODES IN914B